NCCCO FOUNDATION WORKFORCE RESEARCH

Examining Barriers to Entry in the Crane Operator Profession

Final Report



PREPARED FOR:

NCCCO Foundation, Inc.
T.J. Cantwell, Executive Director
tcantwell@ncccofoundation.org

PREPARED BY:

SkillEdge Research & Consulting, LLC; Hofstra University
Christina Curnow, PhD
christina@skilledge-rc.com
Yuliya Cheban-Gore, PhD
Joshua Holtcamp, MS
Anna Bending, MS

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Executive Summary

Overview

The NCCCO Foundation partnered with SkillEdge Research and Consulting and Hofstra University to examine where individuals pursuing a career in crane operation lose momentum and what practical actions could strengthen recruitment, preparation, certification progress, and entry into work. To inform the development of those actions, we integrated four complementary tasks: a targeted literature review which included a national scan of training-program listings, a systematic analysis of public recruitment materials, and an analysis of survey and interview data collected from individuals connected to the crane-operator pathway (see Exhibit 1).

Central question

What barriers prevent individuals from entering the crane operator occupation or completing the certification process, and what actions can be taken to strengthen recruitment and improve entry into the profession?

Exhibit 1. Sources of Information Used for the Study

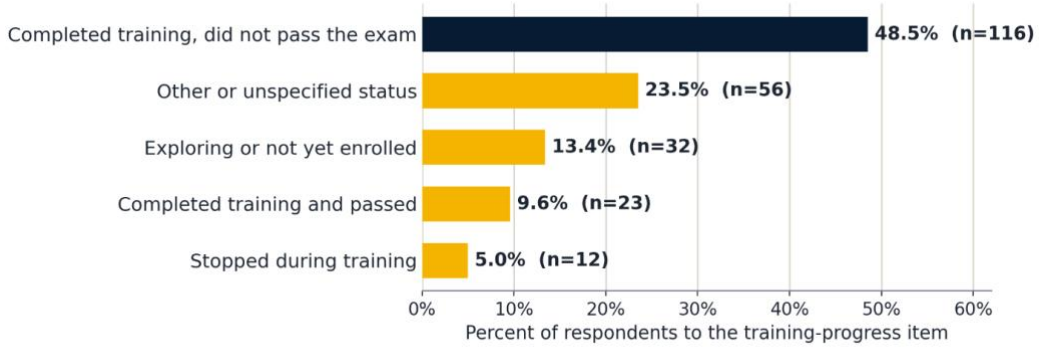


Findings

Within this study sample, interest in the work was not the problem. The largest loss came after candidates finished training but before they earned certification, which raises the question of whether they were fully prepared to succeed (see Exhibit 2).

- **Interest is strong.** Respondents were drawn most by the equipment itself (66%), followed by career growth (58%), job stability (50%), and pay potential (42%).
- **Most candidates stall between training and certification.** A total of 116 of 240 respondents (48.5%) completed training but had not yet become certified, compared with 12 (5.0%) who left during training. Because the sample came from NCCCO records of people already interested in certification, it may undercount those who left earlier.

Exhibit 2. Training Progress



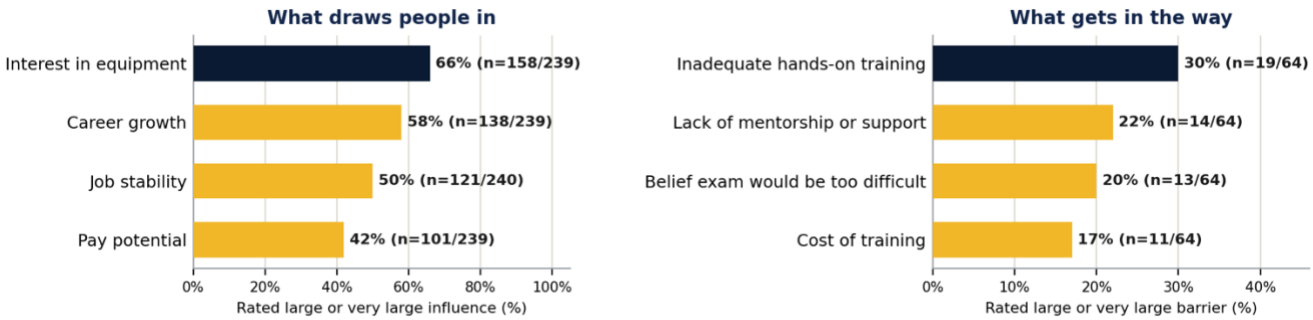
Training-progress item, n = 239, condensed. See Section 5.2 for the full nine-category breakdown.

The barriers respondents described centered on preparation (see Exhibit 3):

- **One-size-fits-all training.** Many programs teach the same content at the same pace to every enrollee, whether an experienced rigger adding a credential or a true beginner, a group the NCCCO Foundation notes is growing.
- **Limited hands-on practice.** Inadequate hands-on training was the top-rated barrier (29.7%), and limited seat time was the most common interview theme (13 of 28).
- **Few options after an unsuccessful attempt.** Candidates typically had to retake the same course rather than get extra seat time or targeted remediation. Retraining, travel, and time off, more than the exam fee, made another attempt costly.
- **Compounding logistics.** Testing logistics, limited mentorship, and unclear next steps left some motivated candidates without a feasible path forward.

> *"I had 20 minutes sitting in the seat to 'learn' the crane … I was disappointed not that I failed, but that the instructor allowed me to test knowing I had never operated a crane."* – Survey respondent

Exhibit 3. Attraction and Barriers



Left: full survey, item n = 223 to 240. Right: routed subgroup, n = 64, not a percentage of the full survey.

Recruitment and Career Pathways

Recruitment practices also reveal a challenge in moving from career awareness to job entry. Among 87 public-facing recruiting materials reviewed, only 16 (18%) provided a realistic job preview, and approximately 70% did not clearly describe a pathway to training or certification. Survey respondents most often first learned about the field through employers or personal networks, while fewer than 6% learned about crane operation through school-based settings. Best practices in recruiting point to a need for recruiting efforts to do more than raise awareness; they should present an authentic picture of the work and provide a clear, accessible pathway into the field (Breaugh, 2008; Phillips, 1998).

Across the data sources, the findings describe a pathway that may initially appear attractive but becomes difficult to navigate at several transition points. For example, a prospective crane operator may first learn about the occupation through an employer or personal connection, identify a seemingly accessible training option, and complete the required instruction, yet still reach the examination stage without sufficient supervised practice, a clear testing plan, or an affordable path forward after an unsuccessful testing attempt. The central challenge is not any single barrier, but the accumulation of uncertainty and obstacles across steps that are often managed by different organizations.

Recommendations

These findings shape the design of solutions. Expanding recruitment alone may bring more people into the pathway without addressing the barriers they encounter later. Similarly, adding preparation resources will have limited impact for candidates who lack access to equipment, must travel to a testing site, or cannot afford to retest. A more effective approach would combine coordinated interventions that clarify the pathway before enrollment, strengthen candidate readiness throughout training and the certification process, and provide timely guidance when candidates encounter challenges or setbacks.

To translate these findings into action, we recommend a coordinated portfolio organized around four action areas that follow the pathway from awareness through informed entry, preparation, and the examination transition (see Exhibit 4). The first area makes the route visible, because a plain-language career-pathway map and competency model, carried into school and adjacent-trade outreach, can reduce the advantage held by those who already know someone in the field. The second area strengthens recruitment by pairing an authentic preview of the work with explicit steps into training and certification and by broadening who appears in that material. The third area concentrates on preparation and the transfer of training, including clearer expectations for supervised practice, curriculum guidance that reflects public examination specifications, and a well-maintained directory of vetted providers and testing sites. The fourth area supports candidates through the transition that this study identifies as the most vulnerable – between the end of initial training and successful completion of the certification exam - through tailored navigation for near-completers (i.e., retraining and refresher practice, equipment access, and mentorship of the kind that many union apprenticeships already supply). Exhibit 4 summarizes the recommendations, the challenges they address, and illustrative first steps for each area.

Exhibit 4. Recommendations

Action area	What it addresses	Illustrative first step
Make the pathway visible	Low awareness and unclear routes into the field	A plain-language career-pathway map and competency model, carried into school and adjacent-trade outreach
Recruit with a route, not just an image	Awareness that does not convert into informed entry	Realistic job previews paired with explicit steps into training and certification, and broader representation
Strengthen preparation and transfer of training	Training not matched to candidates' starting skills, limited supervised practice, and few alternatives to retaking the same course.	Skills pre-assessment with beginner and experienced tracks, seat-time benchmarks, and targeted remediation.
Support candidates through the transition	Loss of candidates between the end of training and successfully passing the test	Tailored navigation for near-completers, support for retraining and refresher practice, equipment access, travel, and mentorship to improve the odds of passing a retest.

The areas are complementary, in that making the route visible will not by itself create supervised practice, retest support will not resolve weak preparation or a distant testing site, and stronger recruitment content will succeed only when it connects to an accessible next step.

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1. Project Overview

Purpose

The NCCCO Foundation sought to understand why some individuals who express interest in crane operation ultimately do not enter training, complete the certification process, or transition into employment. This study was designed to identify specific points at which targeted action may improve progression, while recognizing that non-completion does not reflect a single, shared experience.

Barriers to becoming a crane operator can arise at different stages and may require different solutions. Challenges associated with first learning about the occupation differ from those involved in enrolling in training. During training, individuals may encounter difficulties related to scheduling, cost, or equipment access. After training, they may face concerns about readiness, testing logistics, retesting, or the connection between certification and employment. Identifying when these challenges occur helps clarify which organizations are best positioned to address them.

The study also distinguishes initial interest from continued participation. An individual may express a strong interest in heavy equipment and skilled work but determine that a particular training option, testing process, or route to employment is not feasible. Others may pursue certification to expand their current capabilities rather than to enter an entirely new career. An effective pipeline strategy should account for these different motivations and experiences rather than treat progression as a single pathway.

Research question

Central question

What barriers prevent individuals from entering the crane operator occupation or completing the certification process, and what actions can be taken to strengthen recruitment and improve entry into the profession?

Population and interpretation

NCCCO administrative records were used to contact individuals whose certification pathway appeared incomplete or stalled.[1] The survey subsequently documented a broader range of outcomes: 48 of 240 respondents reported passing, while 188 reported not passing or not completing. This mismatch between the outreach frame and self-reported outcomes constitutes both a limitation and a caution against labeling every participant a non-completer. Note that the survey was not a random sample of all candidates or operators, since the interview participants were self-selected volunteers. Accordingly, the report employs qualifying language such as “within this study sample,” “respondents reported,” and “the evidence suggests.”

[1] The NCCCOF also worked with several training providers to recruit participants; however, less than 2% of the sample came from these sources.

Literature Review and Training-Program Landscape



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2. Literature Review and Training-Program Landscape

The literature review and program scan informed the development of the survey and interview questions and provided context for interpreting the findings.[2] They showed that entering the field depends on more than personal motivation. Training and certification options need to be easy to find, affordable, accessible, and manageable alongside work and family responsibilities. Continued participation may also depend on the quality of supervision and hands-on experience, workplace culture, scheduling and fatigue demands, and opportunities for career advancement.

> *"Certs are a necessary qualification for the job but they mean nothing without experience. Save your money and get a job in the industry or apply for an apprenticeship."* – Reddit User

The review also showed that training programs vary widely in length, format, setting, equipment access, and opportunities for supervised practice. A short program may be appropriate for an experienced worker seeking an additional certification but may not provide enough preparation for someone new to operating heavy equipment. Publicly available program information often does not clearly explain these differences.

2.1 Barrier and retention taxonomy

Exhibit 5 organizes the recurring themes from the 35 coded sources (including peer-reviewed literature, gray literature, topical blog posts, and industry blogs) into entry and retention stages. Because this literature also draws on skilled trades and related occupations beyond crane operation, these categories informed the design of the survey and interview protocols rather than serving as established findings. This study explores whether these categories apply to crane operators. For representative sources related to each category, please see Appendix A.

Exhibit 5. Barrier and Retention Categories Identified in the Literature Review

Stage	Barrier category	Illustrative mechanisms
Entry	Training process	Varied routes, program length, equipment access, sequencing, and supervised experience
Entry	Unclear pathway	Ambiguity about credentials, next steps, timelines, and connection to employment
Entry	Upfront cost	Cost of training, credentials, tools, travel
Entry	Gender norms and belonging	Differences in who perceives the work as available to them, as well as access to networks and mentoring

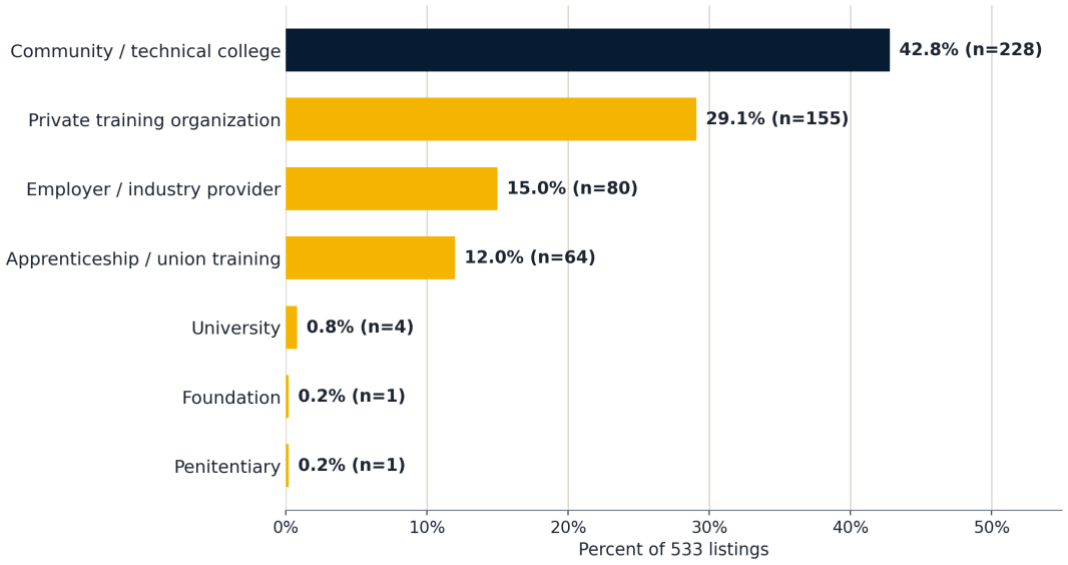
[2] The literature review included closely related trades, as confirmed with NCCCOF. These included CDL Drivers, Truck Drivers, Construction Workers, Plumbers, Electricians, Hoist & Winch Operators, Operating Engineers, Pile Driver Operators, Industrial Truck and Tractor Operators, and Riggers.

Stage	Barrier category	Illustrative mechanisms
Retention	Workload and fatigue	Long hours, distant travel, unpredictable schedules, cumulative strain, and work-life conflict
Retention	Compensation and supervision	Pay and benefits, feedback, support, and quality of supervision

2.2 Provider landscape

We reviewed the CareerOneStop training provider database, a public resource sponsored by the U.S. Department of Labor. When searching for Crane and Tower Operator programs across the United States, we found 533 training programs. The distribution in Exhibit **6** describes where programs were listed (e.g., at community colleges) rather than where candidates actually enrolled or which providers produced stronger outcomes. Even so, this mix is consequential because provider type can shape scheduling, financing, employer connection, and access to equipment and supervised practice.

Exhibit 6. Public Listing of Training Providers*



CareerOneStop listing snapshot, n = 533. A listing indicates database representation, not current capacity or quality.

***Note:** This public list included trainings not only for crane operators but more broadly for heavy equipment operators.*

Community and technical colleges represented the largest visible provider group listed on CareerOneStop, accounting for 42.8%, and private training organizations accounted for a further 29.1%. Employer and industry providers represented 15.0%, while apprenticeship and union training represented 12.0%. The distribution implies that public information pathways need to operate across several institutional routes rather than being based on one national model. Because the CareerOneStop search returned programs that covered heavy equipment operation broadly rather than crane operation specifically, this distribution likely overstates the role of community

and technical colleges as a route into crane certification in particular. It should be read as a picture of the heavy-equipment training landscape, not as evidence of a large crane-specific college pathway.

One implication is that a public directory or pathway map could help users compare routes on the dimensions that matter to decision-making, including prerequisites, total expected cost, schedule, location, equipment access, supervised-practice expectations, credentials addressed, testing logistics, and connection to employment.

As can be seen in Exhibit 7, modality and duration offer a second view of what a candidate may encounter. Exhibit 7 cross-tabulates the 533 listings by delivery format and reported length. It describes public listings rather than assessing whether a particular duration is sufficient for certification readiness.

Exhibit 7. Modality and Duration of Training Providers

Modality	In person (n = 466)	Mixed (n = 47)	Online (n = 20)
Under 12 weeks	54.9%	57.4%	35.0%
12 weeks to <1 year	16.7%	21.3%	25.0%
1 to <2 years	13.9%	10.6%	15.0%
Degree	3.6%	2.1%	15.0%
Other / no data	10.7%	8.5%	10.0%

The publicly visible training landscape is predominantly in-person and frequently short, with 87.4% of listings in person and 54.4% of listings across modalities under 12 weeks. This pattern can improve access for some candidates while making geography, schedule, equipment access, and supervised practice especially consequential.

2.3 Geographic visibility

The listing scan also revealed uneven geographic visibility. California had 86 listings, Texas 67, Ohio 46, and Louisiana 45, while six states returned no listings through the reviewed source.[3] Geographic unevenness matters because candidates may need to travel for practical experience or testing, coordinate time away from work and family, and absorb lodging or transportation costs—burdens that grow after an unsuccessful attempt, when a candidate must weigh repeating the same travel and incurring the same expenses.

[3] A zero in this scan should not be characterized as proof that a state has no training, as the publicly available resource does not claim to be exhaustive.



Recruitment and Job-Preview Materials

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3. Recruitment and Job-Preview Materials

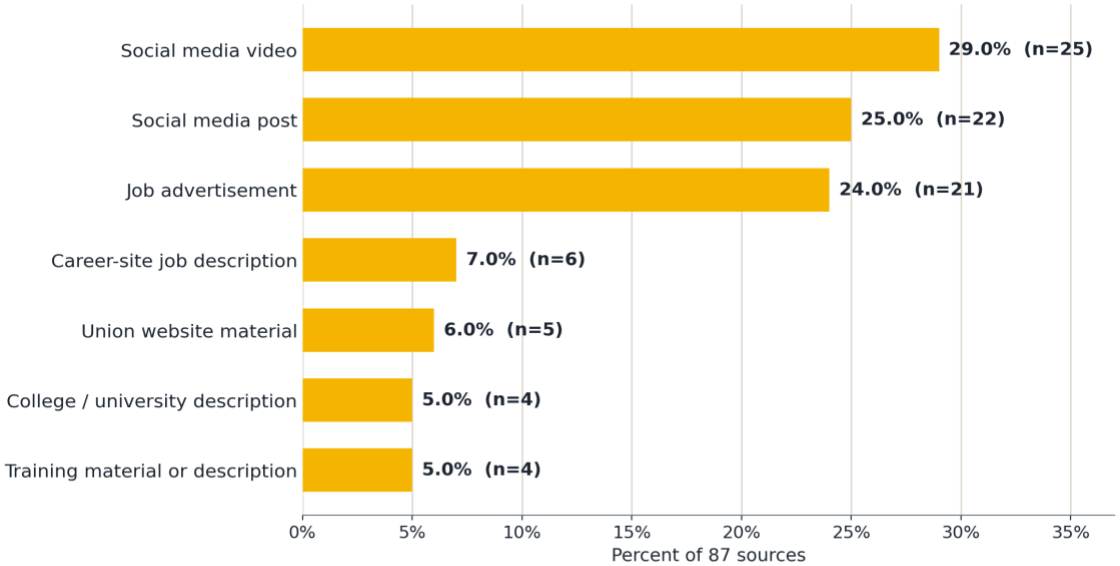
Recruitment is often viewed as a way to attract attention, build interest, and encourage people to apply for jobs. For a specialized occupation such as crane operation, however, recruitment materials can do more. Someone unfamiliar with the field also needs to understand what the work involves, how to enter the field, which credentials may be required, how long the process may take, and what to do next. Without this information, greater awareness may not lead to increased job participation.

As such, the review examined whether public materials both generated interest and clearly explained the work and next steps. Effective materials can highlight the equipment, skilled nature of the work, career opportunities, and value of the occupation while also providing realistic information about working conditions, safety responsibilities, scheduling, physical demands, and training and certification requirements. The goal is not to discourage potential candidates but to help them make informed decisions and begin the process with clear expectations (i.e., providing a realistic job preview).

3.1 Materials reviewed

As seen in Exhibit 8, the 87-source sample incorporated several communication formats because candidates encounter the occupation in different contexts. Social media can generate rapid awareness, job advertisements address people who are ready to apply, career pages can explain roles in greater depth, and union or training-provider pages can describe structured routes. The source distribution in Exhibit 8 reflects what was available for coding during the project's search process. As with the literature review, source collection continued until additional sources no longer yielded new categories, indicating that the sample had reached thematic saturation.

Exhibit 8. Recruitment Source Distribution



Public-source review, n = 87; percentages rounded. Forty-two sources also referenced comparable trades.

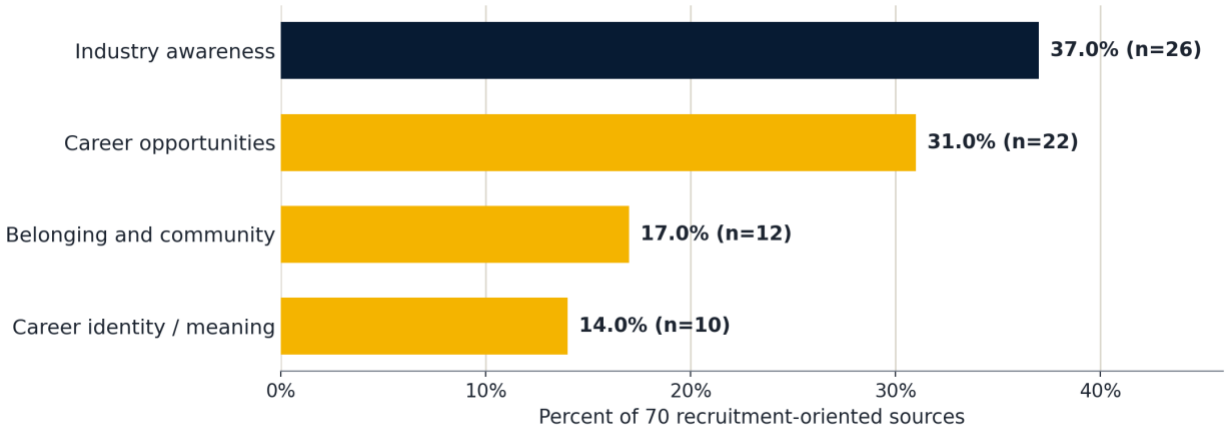
Social-media videos and posts together accounted for 47 of the 87 sources, slightly more than half of the sample, and job advertisements contributed a further 21 sources. Career-site descriptions, union pages, college or university descriptions, and training materials were comparatively less numerous. This format mixture indicates that the review captured a substantial body of short-form, attention-oriented communication and should not be interpreted as a census of any organization's complete recruitment system.

The format mixture also constrains what can reasonably be communicated. A single social post cannot contain every pathway detail, yet it can direct viewers to a clear and accessible next step. A job advertisement or career page affords more room and consequently a stronger opportunity to explain qualifications, training expectations, conditions, and progression. The relevant standard is not identical content in every format but whether the materials operate together as a coherent path.

3.2 Recruitment themes

Seventy of the 87 sources were coded as recruitment-oriented and assigned a primary appeal theme. Exhibit 9 shows what those sources emphasized most strongly. The denominator (n =70) differs from the full 87 because informational and training-only materials were excluded from this particular theme analysis.

Exhibit 9. Primary Appeal Theme



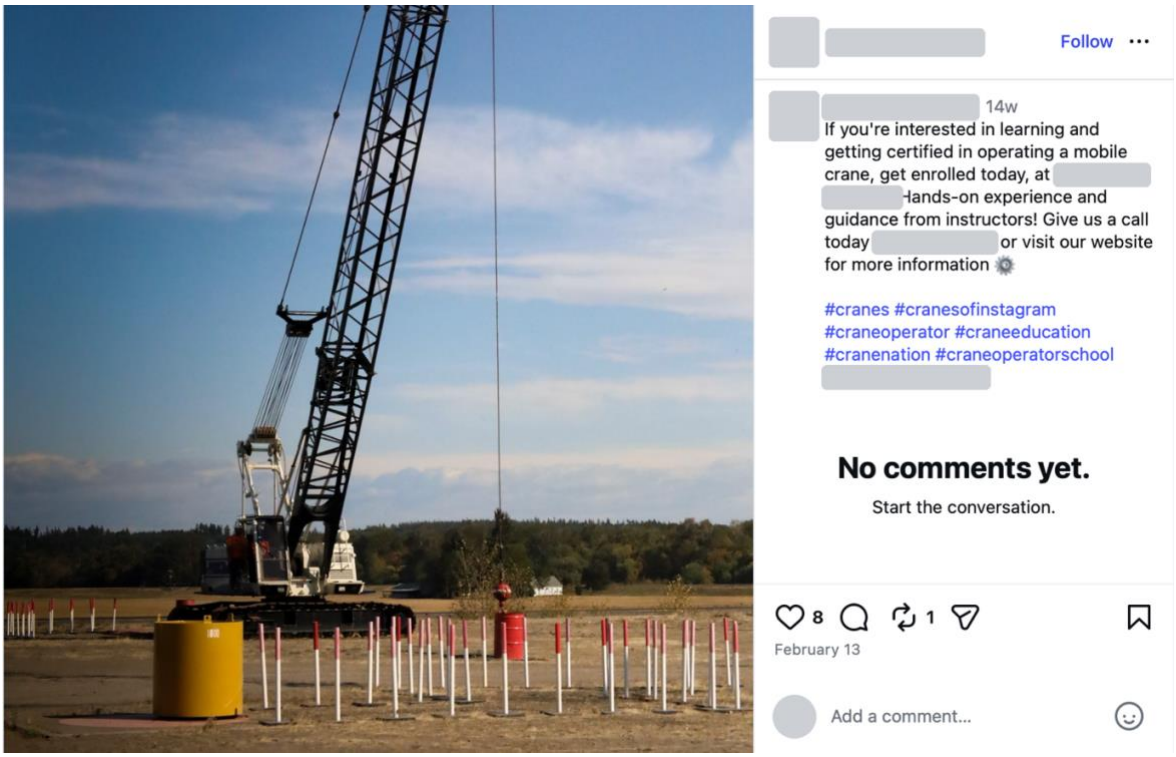
Recruitment-oriented sources only, n = 70; informational and training-only sources excluded.

Industry awareness was the most common primary theme, followed by career opportunities, and together those categories accounted for 68% of the recruitment-oriented sources. Belonging and community appeared in 17% of sources, while career identity or meaning appeared in 14%. The pattern indicates that the field is frequently presented through visibility and opportunity, with less frequent emphasis on how a newcomer becomes part of the occupational community or develops a longer-term identity in the work.

3.3 Realism, pathway clarity, and inclusion

Three findings concerning the substance of the materials warrant emphasis. Across all 87 sources, only 18% offered a substantive look at daily work, environmental conditions, or occupational demands. Approximately 70% did not clearly explain a training or certification pathway, although about half of those still described the occupation in some detail. In addition, 34% included an inclusion signal, of which about half were compliance-oriented equal-opportunity statements, about 25% used representation, and about 10% used open-to-all framing, as illustrated by the caption in Exhibit 10. Many materials appeared to presume prior familiarity with the trade, thereby generating ambiguity for newcomers about how to begin.

Exhibit 10. Example Social Media Post From Training Provider

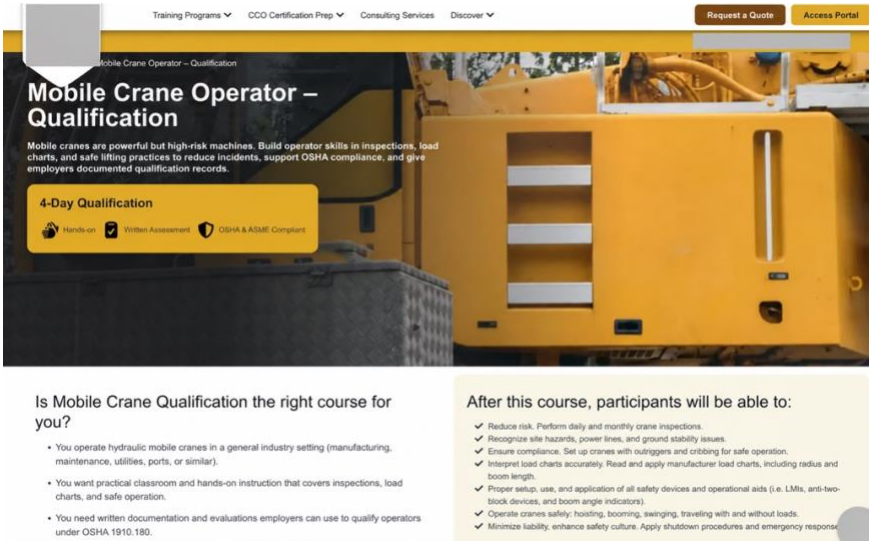


The finding on realistic previews is important because crane work carries meaningful responsibilities and conditions that should not be concealed behind generic recruitment language. A useful preview can convey the scale and precision of the equipment while acknowledging safety obligations, teamwork, outdoor or industrial environments, scheduling, and the need for continuing experience. Realism supports informed choice and can build trust when the eventual experience matches what was presented.

Pathway clarity constituted the larger gap: the majority of sources did not clearly explain a route into training or certification. Although some sources still described the occupation well, an interested viewer could be left without answers to basic questions concerning prior experience, the applicable training route, the first credential, how to find supervised practice, the expected costs, and the destination after researching or signing up for a program. A clear link or pathway map can address those questions without overloading the initial message. Exhibit 11 shows one provider's page for a 4-day qualification course. Notably, the page states that the course is designed for

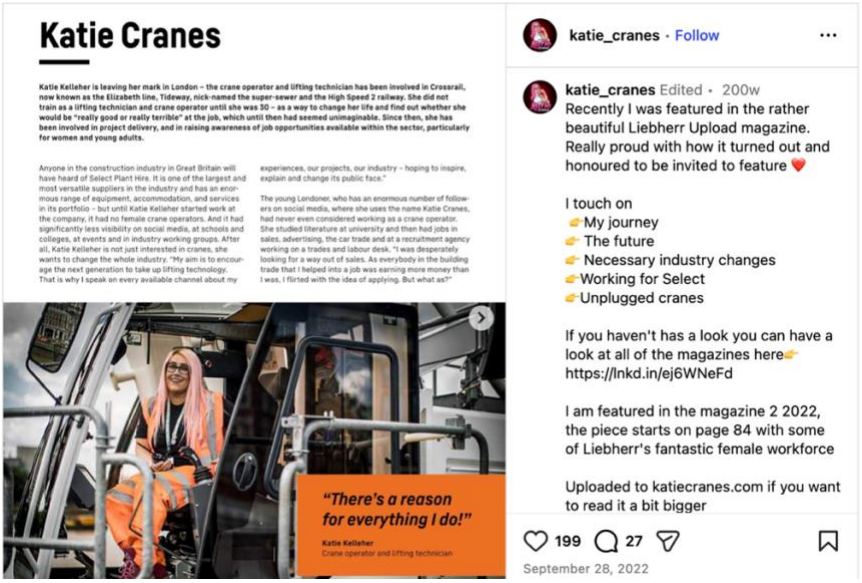
people who already operate cranes, which is exactly the kind of information a newcomer needs. Many listings do not make this distinction, and a true beginner could reasonably mistake a short course built for experienced operators as sufficient preparation.

Exhibit 11. Example 4-Day Training Website



Inclusion signals were present in roughly one-third of the reviewed materials (an example can be seen in Exhibit 12), yet more than half of those signals were compliance-oriented equal-opportunity statements. Compliance language is necessary in many contexts, although it does not by itself demonstrate that a newcomer will see people like themselves, gain access to mentoring, or be welcomed into the work. Inclusion feels more concrete when candidates can see diverse operators, read plain-language messaging that welcomes everyone, and know what support is available.

Exhibit 12. Example Social Media Post Featuring Female Crane Operator





Methodology

4. Methodology

The literature review and recruitment-material analysis described in the previous sections helped us develop our survey and interview material. Specifically, the barrier taxonomy from the literature review identified the entry and retention constructs that the survey and interview protocols were designed to test among individuals who had actually pursued crane certification. The recruitment-material analysis showed how the occupation is presented to prospective workers and informed questions about awareness, expectations, and pathway clarity. The data collection described in this chapter was built directly on those inputs.

4.1 Data Collection

The study used a mixed-methods data collection approach consisting of a brief online survey and a structured interview. Participants were recruited in partnership with NCCCOF through multiple channels to better reach this difficult-to-access population. Primary recruitment efforts targeted individuals identified through crane operator training providers and certification-related organizations who had expressed interest in the occupation but may not have completed training or certification. As an incentive to encourage participation, survey respondents who were not selected for an interview were entered into one of four random drawings for a $50 gift card, and each interview participant received a $100 gift card for their time.

To ensure data quality, the survey incorporated multiple validation procedures, including eligibility screening questions and technical checks to identify duplicate or potentially invalid submissions. Additional details regarding participant recruitment, survey development, interview procedures, and data quality safeguards are provided in the following sections.

Survey. A survey was developed to measure career awareness, job attraction, training progress, examination status, rated barriers, the single most important reason for non-completion, and background characteristics. The survey was designed to assess factors influencing participants' decisions not to enter the occupation. Survey items were informed by findings from the literature review. Status questions described how far along the training and certification pathway respondents had progressed. Attraction items asked how strongly specific factors influenced interest. When respondents reported that they had not completed training or selected "Other," they were presented with barrier items that measured the extent to which the listed issues affected their intent to continue pursuing crane operation. A separate question asked participants to select the single most important reason.

Interview. At the conclusion of the survey, respondents were invited to participate in a paid follow-up interview. The interview protocol was developed to explore participants' experiences and decision-making in greater depth. Twenty-eight interviews, which lasted approximately 15 to 30 minutes, were conducted with survey respondents who opted to participate.

4.2 Analyses

Survey and interview data were analyzed using complementary quantitative and qualitative approaches. The survey data were summarized using descriptive statistics to characterize

participants' experiences and perceived barriers to entering the crane operator occupation. Frequency counts and percentages were calculated for participants' reported training pathways and the stage at which they exited the pathway. For survey items assessing barriers to entry, frequency distributions, mean scores, and standard deviations were calculated to summarize the prevalence and relative importance of each barrier. One open-ended survey question was also reviewed for recurring themes, with responses grouped into categories and frequency counts calculated for each category.

The interview data were analyzed using a structured qualitative coding process. A codebook was developed based on the study objectives and emerging concepts from the interview data. Interview transcripts were then processed using AI-assisted techniques to support coding and identify patterns across participants' responses, with all AI-generated outputs reviewed and quality checked by members of the research team. The final analysis focused on identifying recurring themes and insights regarding factors that influenced participants' decisions not to pursue the crane operator occupation.



Results

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5. Results

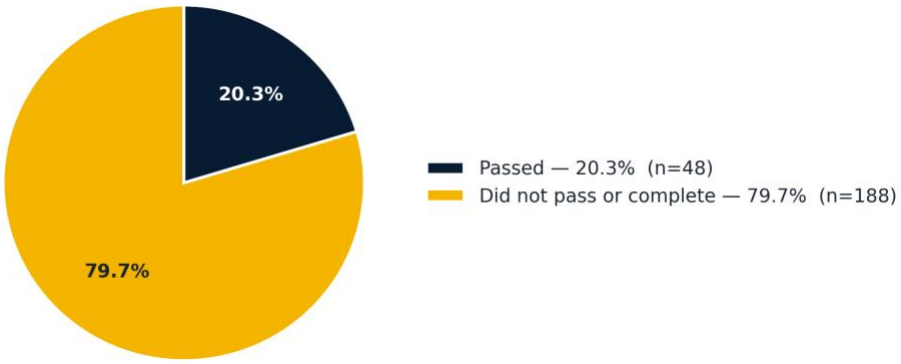
The survey and interviews help us to understand how people in this study sample encountered and moved through the crane-operator pathway. Note that because the survey employed routing, the denominator changes across topics. Most status and attraction measures include more than 200 respondents, whereas the detailed barrier matrix reached 64 respondents. Open-ended coding is based on 130 written responses, and interview findings are based on 28 volunteer participants. These differences are restated throughout so that a percentage is never mistaken for a result derived from the entire sample when it originated in a smaller subgroup.

5.1 Sample

The final analytic survey sample comprised 240 respondents, all of whom reported that they had never been employed as crane operators. Item-level denominators vary because not every participant answered every demographic question. The survey reached individuals who had started, considered, stopped, or completed the certification pathway but ultimately had not been employed as crane operators. Four in five respondents to the examination-status item had not passed, as shown in Exhibit 13.

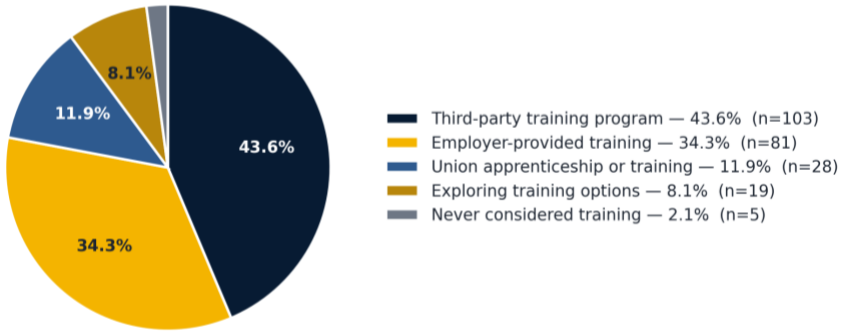
Attraction items were asked of everyone, generating responses from 223 to 240 participants, whereas the barrier questions were routed only to a subgroup of 64 eligible respondents. In addition, 28 interviews provided deeper insight into participants' experiences, so interview data are expressed as a given number out of 28, describing this set of cases rather than rates in the broader workforce. The exhibits below summarize examination status and training route; the participant-demographics subsection that follows presents the survey and interview profiles in detail.

Exhibit 13. Exam Status of Participants



Training routes. Respondents reported several kinds of training exposure (see Exhibit 14). Third-party and employer routes together accounted for 78% of responses. This concentration of responses suggests that provider engagement and employer coordination are central to any improvement strategy, while also indicating that a single resource may not serve every route.

Exhibit 14. Training Type



> "I have never met another woman running a crane. Never. I've never even run into one or heard of one."
> Interview participant 2

Survey participant demographics. Exhibit 15 summarizes the demographics of the survey participants. The average age of participants was 44.8 years. Most participants identified as men (94.0%), while 4.1% identified as women. A majority of respondents (56%) reported their race/ethnicity as White/Caucasian. These proportions are somewhat consistent with the national crane and tower operator workforce, which the U.S. Bureau of Labor Statistics[4] estimated in 2025 to be 4.5% women, 80.4% White, 12.7% Black or African American, 3.8% Asian, and 21.2% Hispanic or Latino. Among the 235 survey respondents who reported the state in which they enrolled in or considered training, 40 states were represented. The largest share of respondents trained or considered training in the South (36.6%), followed by the West (31.1%), Midwest (19.6%), and Northeast (12.8%). California accounted for 17.4% and Texas for 12.8%; no other state exceeded 5.1%. This item reflects training or prospective-training location rather than residence.

Exhibit 15. Survey Participant Demographic Profile

Characteristic	Category or statistic	n	Percent or value
Age (n=200)	Mean	200	44.8 years
	Median	200	45 years
	Range	200	20-74 years
Gender (n=218)	Man	205	94.0%
	Woman	9	4.1%
	Non-binary / gender non-conforming	1	0.5%
	Prefer not to say	2	0.9%
	Prefer to self-describe	1	0.5%
	White / Caucasian	122	56.0%

[4] https://www.bls.gov/cps/cpsaat11.htm

Characteristic	Category or statistic	n	Percent or value
Race/ethnicity (n=218)	Hispanic or Latino/a/x	53	24.3%
	Black or African American	18	8.3%
	Asian or Asian American	6	2.8%
	American Indian or Alaska Native	2	0.9%
	Other	9	4.1%
	Prefer not to say	8	3.7%
Training region, enrolled or considered (n=235)	**South** TX (30), VA (8), FL (8), WV (7), OK (7), GA (6), NC (5), LA (4), SC (3), AR (2), AL (2), KY (2), MD (1), TN (1)	86	36.6%
	West CA (41), UT (8), WA (7), CO (6), OR (4), AZ (3), HI (2), NM (1), NV (1)	73	31.1%
	Midwest IN (12), MI (8), OH (8), IL (4), WI (4), MN (3), IA (2), MO (2), KS (1), ND (1), SD (1)	46	19.6%
	Northeast NY (9), PA (9), NJ (5), ME (3), MA (2), VT (2)	30	12.8%

Interview participant demographics. As shown in Exhibit 16, most interview participants were between 25 and 44 years old, identified as men, and reported their race/ethnicity as White/Caucasian. The 28 interview participants resided in 15 states. California accounted for 7 participants (25.0%), Ohio and Texas for 4 each (14.3% each), Michigan for 2 (7.1%), and Georgia for 1 (3.6%); the remaining 10 participants were distributed across 10 additional states. Because the interview measure reflects residence, it should not be treated as directly equivalent to the survey state item.

Exhibit 16. Interview Participant Demographic Profile

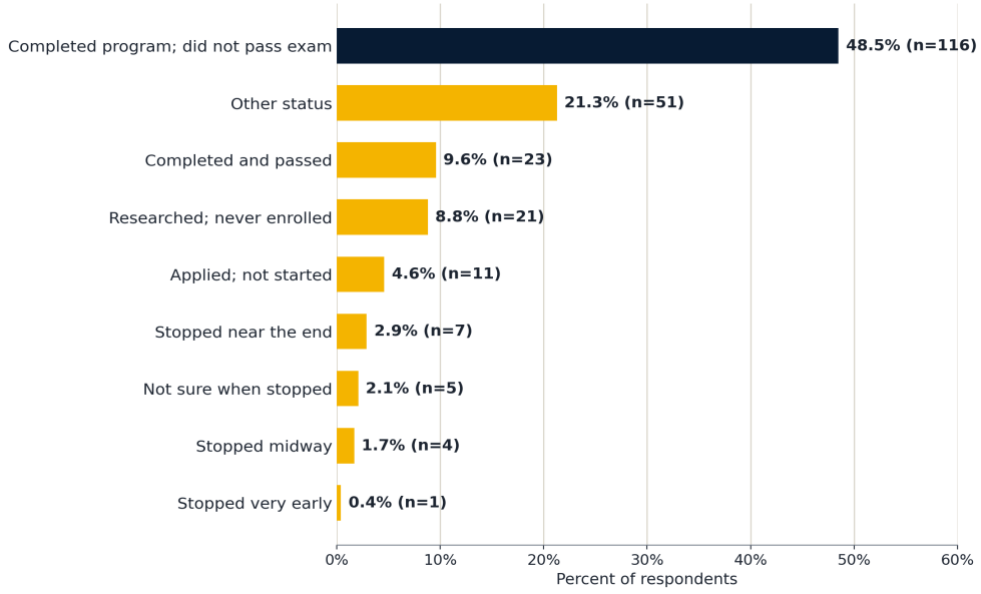
Characteristic	Category or statistic	n	Percent or value
Age range (n=28)	18-24	1	3.6%
	25-34	8	28.6%
	35-44	12	42.9%
	45-54	4	10.7%
	55-64	2	7.1%
	60-69	1	3.6%
Gender (n=28)	Man	24	85.7%
	Woman	4	14.3%
Race/ethnicity (n=28)	White/Caucasian	18	64.3%
	Hispanic/Latino	5	17.9%
	Black/African American	3	10.7%

Characteristic	Category or statistic	n	Percent or value
	East Asian	1	3.6%
	Mexican and White / multiracial	1	3.6%
Residence state (n=28)	Midwest OH (4), MI (2), IA (1), IN (1), MO (1)	9	25.0%
	West CA (7), UT (1), WA (1)	9	14.3%
	South TX (4), GA (1), LA (1), VA (1), WV (1)	8	14.3%
	Northeast CT (1), PA (1)	2	7.1%

5.2 Pathway status

Training progress indicates respondents' reported status at the time they completed the survey. The categories are not a longitudinal flow of one cohort but a cross-sectional snapshot of people at different stages. Even with that limitation, the distribution helps identify which transitions warrant closer attention. Exhibit 17 summarizes this information.

Exhibit 17. Training Progress



The largest observed attrition in the pathway occurred after training rather than during it, with post-training attrition occurring before candidates passed the examination. This pattern does not show that training or the examination caused non-completion, but it isolates a transition worth closer evaluation during interviews. The contrast is substantial within the sample: 48.5% of respondents reported completing a program without passing the examination, while only 5% reported stopping very early, midway, or near the end of training. That pattern shifts the practical question away from

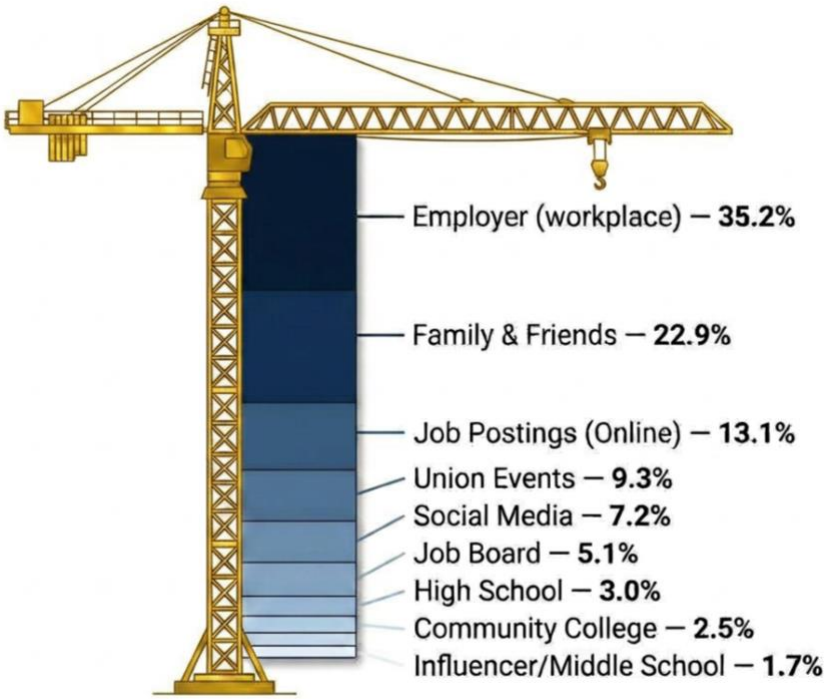
how to keep people enrolled and toward what happens between the completion of instruction and the successful navigation of certification. Both questions matter, although they require different information and different partners.

The 51 respondents in the other-status category serve as a further reminder that a pathway diagram should not be interpreted overly rigidly. Some individuals may be between steps, pursuing a different component, using training for a supplemental skill, or interpreting the available options in ways that the fixed categories did not capture.

5.3 First awareness

The question about where respondents first learned about crane operation helps identify which channels currently introduce people to the field. It does not measure the quality of that introduction or the source that ultimately produced enrollment, although it does reveal the relative importance of workplace and personal networks within this sample. As shown in Exhibit 18, workplace or employer-related exposure was the largest single source, with 35.2% of responses. A further 18.2% cited online job postings or job boards, and 7.2% cited social media; family members, friends, or acquaintances accounted for 22.9%. These responses portray awareness as heavily networked through work and personal relationships. The workplace figure likely reflects a common route into the occupation, in which people begin in construction or a related field, such as heavy haul, equipment operation, or commercial driving, and are later identified by an employer and moved into crane operation. Because very few research participants were recruited through training providers, the sample may also underrepresent people who first encountered the occupation through an advertisement or on their own.

Exhibit 18. How Participants Learned About Crane Operation



School-based exposure was comparatively limited. Middle school, high school, and community college sources combined for 14 responses, or 5.9% of the awareness item. This does not show that school outreach is ineffective; rather, it indicates that few respondents in this sample first encountered the occupation through those channels. The interviews reinforced school and trades outreach as an opportunity, with 50% of interview participants recommending stronger school-based or trades-based exposure, which produces a notable tension in that schools deliver almost no awareness today yet interviewees consistently name schools as one fix.

> "If I would have seen this in high school … you could have come right out of high school, got your crane certification … But I had no idea that this was a thing."
> Interview participant 15

> "For me, I…disagree with going to get…the high schoolers. Maybe they need to go learn the rigging before they can go operate a crane… I've seen stuff [go] sideways real quick. And I think before you're going to be in charge of lifting 85 tons to…200-plus tons, you need to be rigging or something first. Be around the crane before you be in it."
>
> Interview participant 13

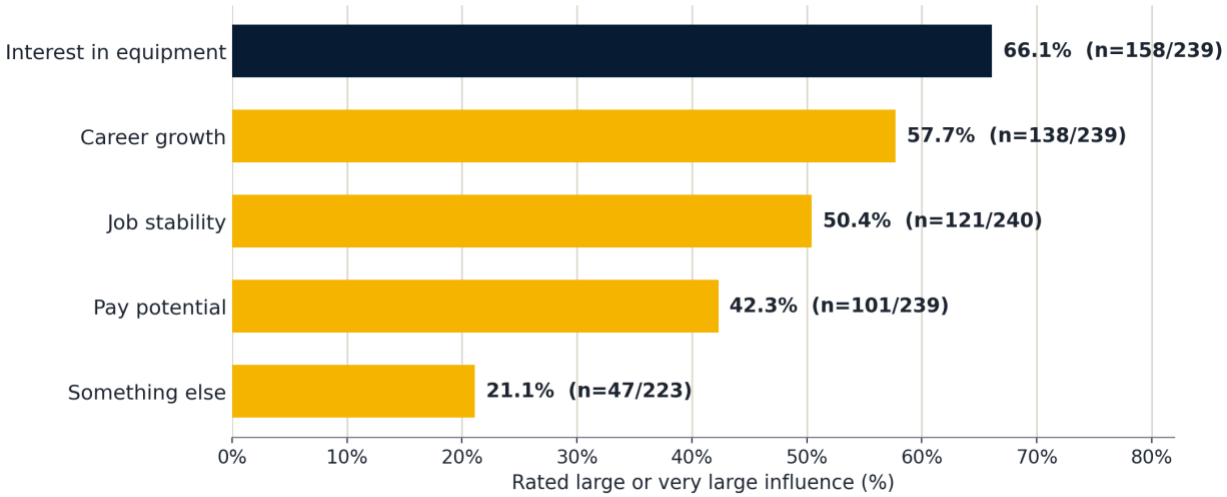
Though, some of our participants note the value of early crane career awareness, one participant shared a concern about moving directly from high school into crane operation because of the level of responsibility. Additionally, across our review of social media information, people in the field typically do not extend the level of trust and responsibility the role requires to an 18-year-old, and insuring very young operators can be difficult or impossible. Most operators first build experience in a related field, such as general construction, truck driving, or rigging and signaling, before becoming crane operator certified. The age profile of this sample is consistent with that pattern. School-based outreach is therefore most useful when it introduces crane operation as a part of a longer-term career path and explains the related-industry experience that typically comes first.

The recruitment implication seems to be twofold. Employers and people already connected to the trade should be equipped with accurate plain-language materials because they function as influential messengers. At the same time, outreach can expand beyond existing networks so that students and career changers without a personal connection possess a credible way to discover and understand the occupation.

5.4 Attraction

Attraction items asked respondents how strongly several factors influenced their interest. The figure in Exhibit 19 reports the share of respondents selecting a large or very large influence. Because item response varied, each factor carries its own count and denominator; not all 240 respondents answered every item.

Exhibit 19. Factors Rated as Having a Large or Very Large Influence on Interest

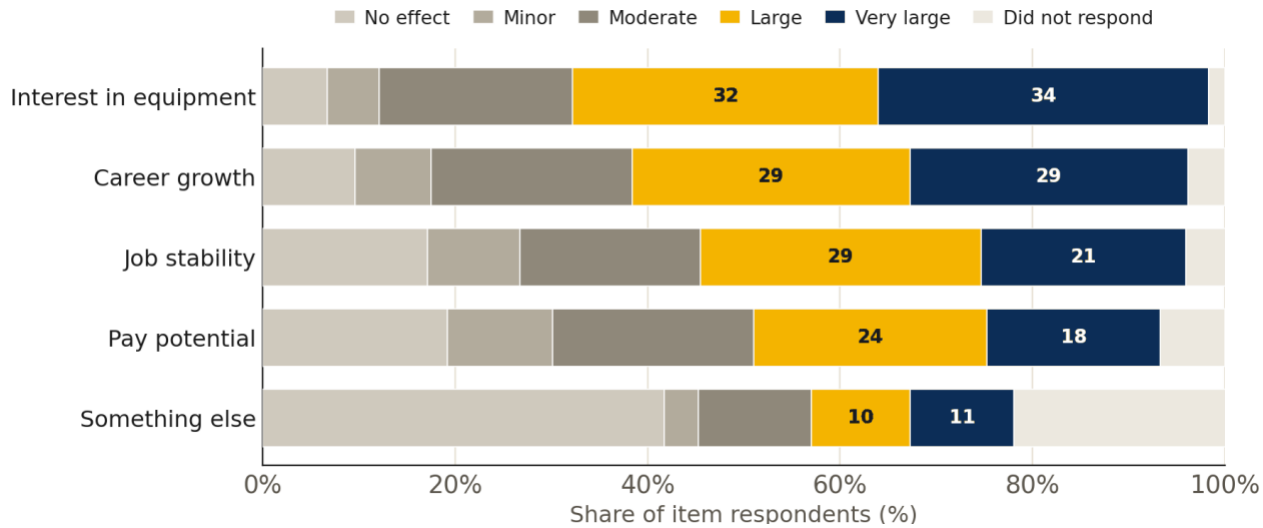


Five-point influence scale; bars combine 'large' and 'very large.' Item n shown in parentheses.

Interest in equipment was the strongest measured attraction, followed by career growth and job stability. Pay mattered, yet it was not the strongest influence among the factors measured. This ordering suggests recruitment should not be built around wages alone; the craft of operating large equipment, the sense of mastery, visible progression, and stable, skilled work constitute central parts of the value proposition. The full response distribution in Exhibit 20 adds a further nuance: the something-else item drew the most non-response and the most no-effect ratings. These results suggest that the item provided little analytic value and merits revision in any future survey wave.

> "It's like a big toy, really. I don't know if that makes sense or if that sounds crazy."
>
> Participant 5, Ohio carpenter

Exhibit 20. Full Rating Distribution for Each Attraction Factor



The interviews provided further insight into these survey results. Twelve of 28 participants described equipment affinity as a primary or secondary attraction, 16 offered at least one identity-relevant interest statement, eight described opportunity or pay, seven framed certification as an added capability, and three valued variety. For some participants, cranes were intrinsically interesting or connected to a long-standing identity around machinery and skilled work, whereas for others certification was valuable because it expanded what they could do within an existing role. These motivations suggest different messages and next steps, since a newcomer may require a complete occupational pathway while an experienced adjacent worker may require only a concise explanation of how certification complements current skills.

> "Cranes are cool. That's the one piece of equipment you see from five or six miles away on a construction site."
>
> Participant 22, Ford millwright

The open-ended survey responses on why respondents pursued certification reinforce the interview findings, showing that many respondents were already in the trade before pursuing certification. Exhibit 21 organizes representative verbatim responses into recurring motivational themes.

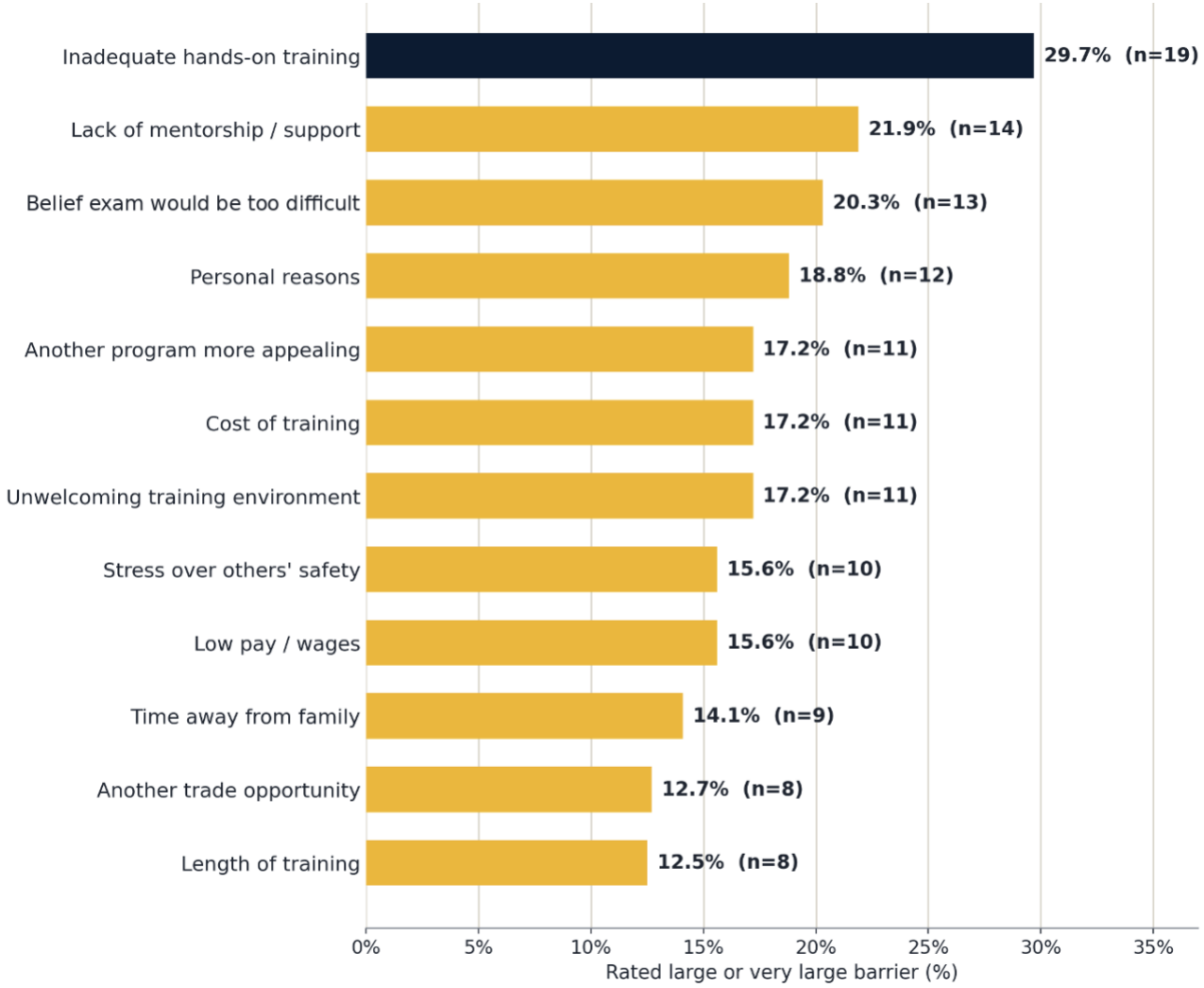
Exhibit 21. Open-Ended Survey Responses to Attraction

Motivational theme	Representative verbatim responses
Employer mandate or job requirement	• "Employer won't allow operation of crane without certification" • "My upper management would not allow me to continue"
Already in the industry	• "I've been rigging on cranes for around 15 years and I have my NCCER Advance in rigging" • "I've been in Iron Worker most of my life, and I had a chance to go to crane CCO training"
Business ownership	• "I own a crane operator company and wanted to be able to run my cranes" • "Code compliance requirement for my own business"
Career opportunity or advancement	• "Crane/equipment operation offers career opportunities in many fields and locations" • "I'm looking for year around work"
Family and personal pride	• "My family's financial stability" • "The pride in getting hands dirty while operating heavy equipment"
Location or health consideration	• "Live in very rural location with shortage of careers" • "Having a bad knee I decided that being a crane operator would be easier on me as I age"

5.5 Rated barriers

The rated-barrier matrix was shown to a routed subgroup of 64 respondents, and the percentages in Exhibit 22 combine large and very large effects.

Exhibit 22. Barriers Rated as Having a Large or Very Large Effect Within the Routed Subgroup



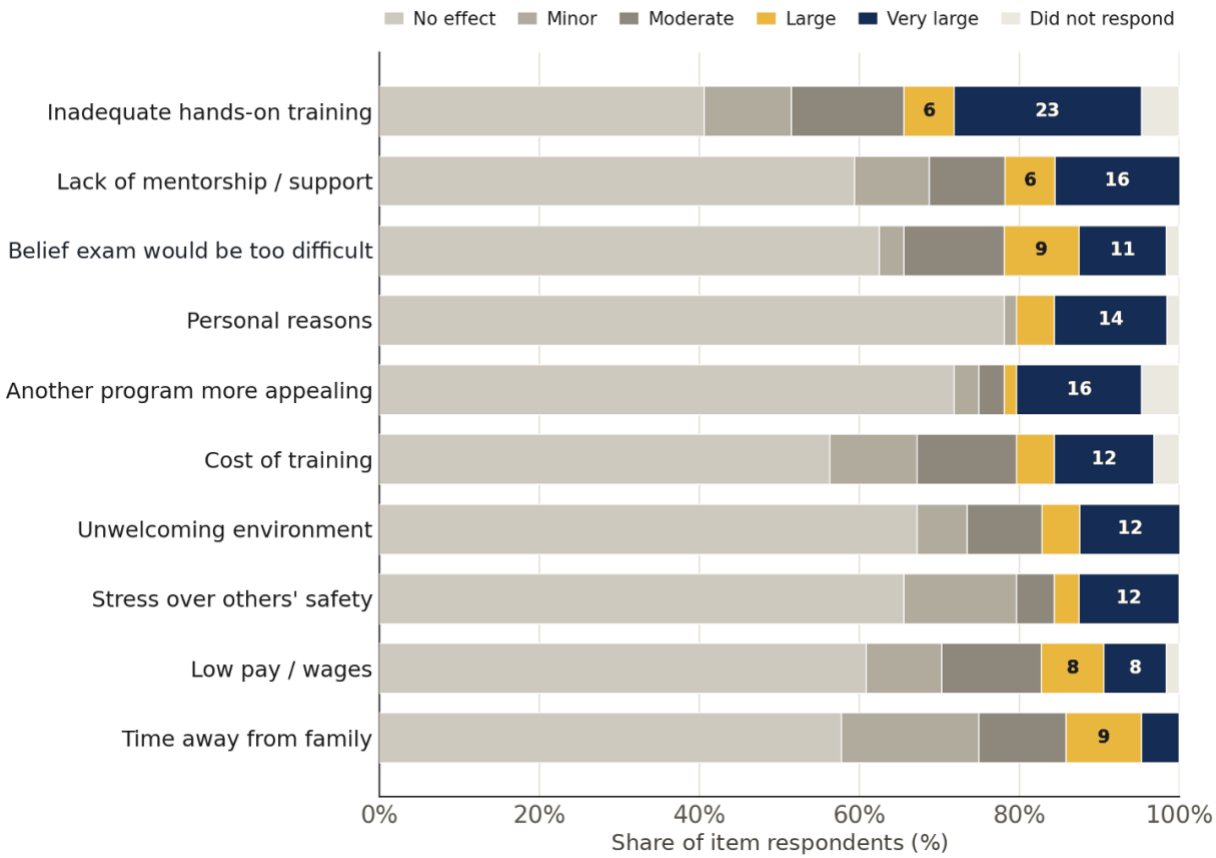
Inadequate hands-on training was the most prominent rated barrier, with 29.7% of the routed subgroup describing it as having a large or very large effect. A lack of mentorship or support followed at 21.9%, and perceived examination difficulty at 20.3%. The top three items thus cluster around preparation and the support required to translate instruction into demonstrated performance. The remaining results indicate that the transition cannot be reduced to academic or technical preparation, since personal reasons, cost or an unwelcoming environment, responsibility for the safety of others, low pay, time away from family, competing trades, and training length also emerged as rated barriers. For some candidates, several moderate burdens may combine into a stopping point even where no single issue dominates.

The full rating distribution clarifies why the subgroup matters. Inadequate hands-on training is the only item whose no-effect share falls below half, at 40.6%. Personal reasons is bimodal, with 78.1% reporting no effect and 14.1% reporting a very large effect; this identifies a small group for whom that factor is decisive. The lower half of the matrix, by contrast, is dominated by no-effect responses, so the classic deterrents associated with dirty or difficult work, including job conditions, irregular hours, and physical demands, which were also options on the survey, are not what is stopping this sample, as seen in

> "After about two days of the class, it just seemed like they were purely teaching the test itself versus any sort of core information … what I was looking for … was some more seat time, more actually getting accustomed to the equipment."
> Interview participant 12

Exhibit 23.

Exhibit 23. Full Rating Distribution for the 10 Most Prominent Barriers

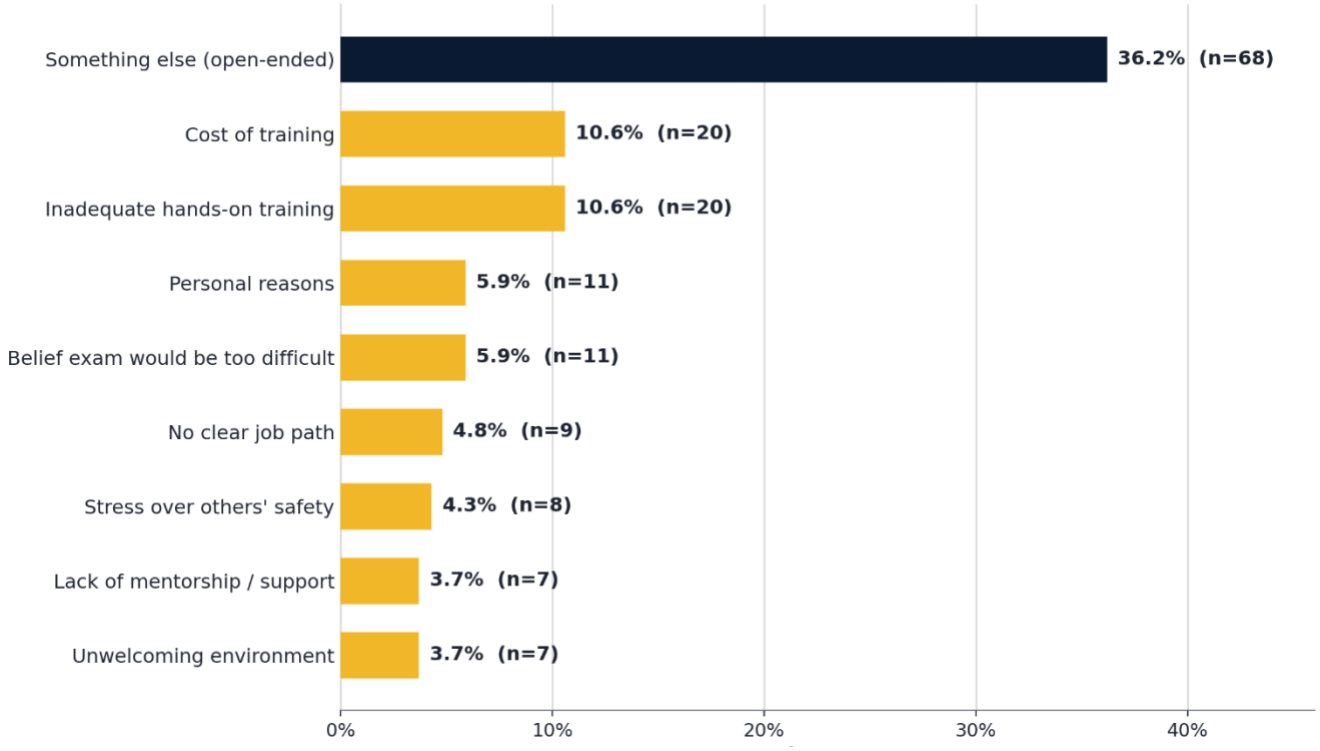


The practical implication is the need for more tailored support, since candidates who lack supervised practice require a different approach from those whose progress is limited by travel, cost, family responsibilities, or uncertainty about how certification connects to employment.

5.6 Most important reason and open-ended response option

All 188 non-passers received a single-most-important-reason item, and, as shown in Exhibit 24, the something-else option was the most frequently selected response at 36.2%. Training cost and inadequate hands-on training each accounted for 10.6% of responses, personal reasons and perceived examination difficulty each accounted for 5.9%, and no clear job path accounted for 4.8%.

Exhibit 24. Single Most Important Reason for Non-Completion



The 68 respondents who selected the open-ended response option primarily described difficulties at the examination stage. Many reported that they had not passed the practical examination, sometimes after multiple attempts, while others had passed one component but not the other. In many of these accounts, the underlying issue was preparation, such that respondents described arriving at the examination without enough time on the equipment, without enough practice interpreting load charts, or with study materials that had not prepared them for the tasks they were asked to perform. Some respondents also expressed concerns about the written examination, describing questions that did not match what they had studied for or that seemed unrelated to the certification they were pursuing, as well as time limits on load chart sections that did not reflect how that work is done on the job, one respondent specifically felt that many questions "focused on administrative details and obscure information that did not seem relevant to actual crane operation."

Respondents also described administrative, scheduling, and financial barriers associated with testing. They reported difficulty arranging online proctored examinations, meeting technology and room requirements, locating an eligible proctor, and finding available practical examination dates.

In some cases, delays caused training or eligibility periods to expire, requiring candidates to repeat coursework they had already completed. Respondents noted the cost of retraining and retesting fees, withdrawn sponsorship, and other costs created additional barriers.

> "Could not get a crane to practice for my practical exam."

Access to practice equipment was another frequent and concrete concern. Some respondents could not locate a usable crane or obtain sufficient practice time before the practical examination. Employer and workplace circumstances also affected completion. Candidates described employers that would not authorize retesting, companies that closed after paying for training, layoffs, and situations in which they were never sent back to complete the process. Others concluded that certification was not worthwhile because no job was waiting at the end, steady crane work was unavailable locally, or certification was not required in their current roles.

Personal and family circumstances accounted for another set of responses, including surgery, bereavement, relocation, and test anxiety. Despite these barriers, a notable number of respondents remained interested in crane operator certification and had not abandoned the occupation. Their responses suggest that non-completion did not always reflect a loss of interest. In many cases, candidates appeared to need clearer guidance, a feasible opportunity to retest, or a more accessible next step.

Open-ended survey responses

> " I had 20 minutes sitting in the seat to 'learn' the crane … I was disappointed not that I failed, but that the instructor allowed me to test knowing I had never operated a crane."

At the close of the survey, respondents were invited to describe any additional experiences during training or while researching training that contributed to their decision not to pursue a crane-operator career.

Preparation and time on equipment were the most common themes. Respondents frequently described training that was too brief or rushed to build familiarity with the equipment. Several felt that training had not given them the knowledge and operating skills they needed to perform confidently on the examination.

Some respondents also described difficulty completing the timed practical examination. Several framed this as a tension between the pace expected at testing and the deliberate pace emphasized for safety on the job. Read alongside the seat-time findings, these accounts may also reflect limited opportunity to practice operating smoothly and efficiently under realistic conditions before testing.

> "I applied and put a deposit down. Got hurt and had to cancel for awhile. Now the cost is over $5000. And I have kids to feed, so can not come up with enough spare money."

Cost was the next most frequently reported concern. Respondents described difficulty paying for training as well as examination fees, particularly when another attempt required an additional investment such as paying for additional training, travel, or equipment access. For some, the accumulating costs ultimately made continued participation financially impractical.

The comments were not uniformly critical. A meaningful number of respondents described positive training experiences, praised their instructors, or characterized crane operation as an appealing career. Many also indicated that they still intended to obtain certification. These responses suggest that non-completion did not always reflect dissatisfaction with the occupation or a permanent decision to leave the pathway.

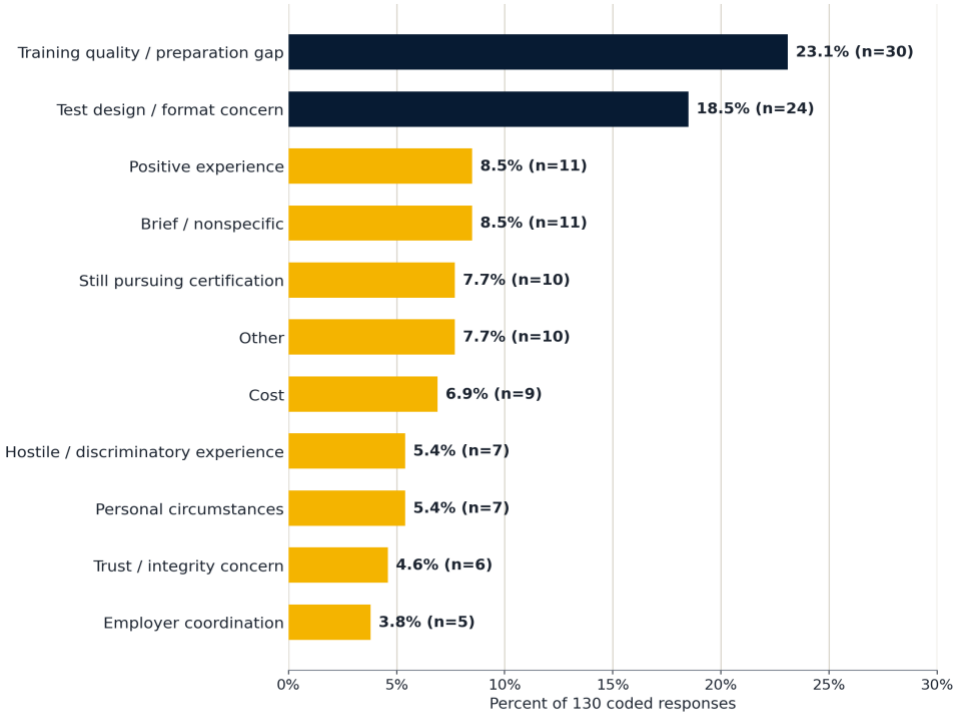
> "Being a woman in this industry still comes with its own issues … they lack trust in a woman to operate a 45-ton crane."

A smaller group raised concerns related to preparation support, fairness, test anxiety, and belonging. One respondent described experiencing a severe panic attack before the written examination. Another discussed the additional challenges she encountered as a woman in the industry, including feeling less trusted to operate equipment despite having relevant experience. These comments represent individual perceptions rather than independently verified accounts, but they reinforce the importance of monitoring whether candidates experience the pathway as supportive, fair, and accessible.

Coding each response into a single primary theme produced the distribution shown in

Exhibit 25. Preparation and testing concerns were the most common, followed by cost, personal circumstances, and coordination with employers or training providers. The results also include a notable share of positive experiences and responses from individuals who remain interested in completing the certification pathway.

Exhibit 25. Assigned Theme for Coded Free-Text Responses



Open-ended coding, n = 130. Training-quality and test-design themes together account for 41.5%.

5.7 Interview barrier mechanisms

The interviews were designed to explain how barriers operated and interacted. Theme counts indicate the number of cases in which a mechanism appeared and themes can co-occur within a single interview. Exhibit 26 summarizes the most relevant mechanisms for the transition from training through testing and continued pursuit.

Exhibit 26. Barriers That Emerged in the Interviews

Interview theme	Cases (of 28)	Interpretation
Seat-time deprivation or condensed training	13	Readiness and familiarity may be constrained by insufficient supervised practice
Gaps between training and required skills	4	Training did not always cover the content, conditions, equipment, or current load charts candidates needed
Testing infrastructure	3	Site availability, proctoring, scheduling, and travel can add friction
Cost and pay	3	Combined costs of retraining, travel, time, and retesting can become burdensome after an initial attempt
Competing opportunities	4	Alternative work can offer a faster or clearer route

Interview theme	Cases (of 28)	Interpretation
Work-life balance	2	Shift structure and family demands can determine who attends training at all
Safety and stress	2	Responsibility for self and others can affect fit, often through role-stacking
Employer communication	1	Weak coordination can break continuity at the point of enrollment

> "Could not get a crane to practice for my practical exam."
>
> Survey respondent

Limited seat time or condensed training appeared in 13 of the 28 interview cases, which made it the most frequently coded interview barrier. Participants described the difference between receiving information and developing familiarity through repeated supervised operation. They also described four ways in which training fell short of the skills they needed to demonstrate: content (study materials that did not cover what they needed to know), conditions (practicing only on a single course layout), equipment (training on a crane different from the one they would need to operate for the practical exam), and currency (training with load charts that had since been revised). These findings align with the rated survey barrier for hands-on training and with the open-text preparation theme, making this one of the strongest points of convergence across the study.

Testing infrastructure and cost illustrate how a setback can become an exit. Remote proctoring requirements and disappearing local test centers, combined with the cost of retraining and retesting, meant that a person who had already invested time might face another fee, another trip, or a delay while a different job was immediately available. In that context, navigation and timely follow-up may matter as much as motivation, and the evidence supports pilot-testing the introduction of additional training supports matched to the reason a candidate stalled (for example, additional seat time, targeted remediation, or help with scheduling and travel), rather than offering every unsuccessful candidate the same assistance. Competing opportunities, work-life balance, and safety or stress rounded out the mechanisms, with the clearest stress cases involving role-stacking, in which crane duties were layered on top of an existing role rather than arising from concerns about the crane itself.

> "The job ended right before I had time to go take the practical, and then I couldn't find anywhere that would let me use the crane... I would have had to pay for the whole course again, and the risk to reward thing was kind of off, because I would have to take time off of work... I just figured I would get it the next time [a] company offered it."
>
> Participant 5

The open-ended survey responses corroborate and extend the interview barrier mechanisms. Respondents described passing one component while failing or deferring the other, testing logistics that ranged from proctoring-room requirements to website registration on a mobile device, employer and workplace coordination failures, concerns about test format and content , the absence of crane access for practice, perceived unfairness or integrity concerns, and continued

pursuit despite a setback. Exhibit 27 presents representative verbatim responses across these categories.

Exhibit 27. Representative Survey Quotes Supporting Interview Findings

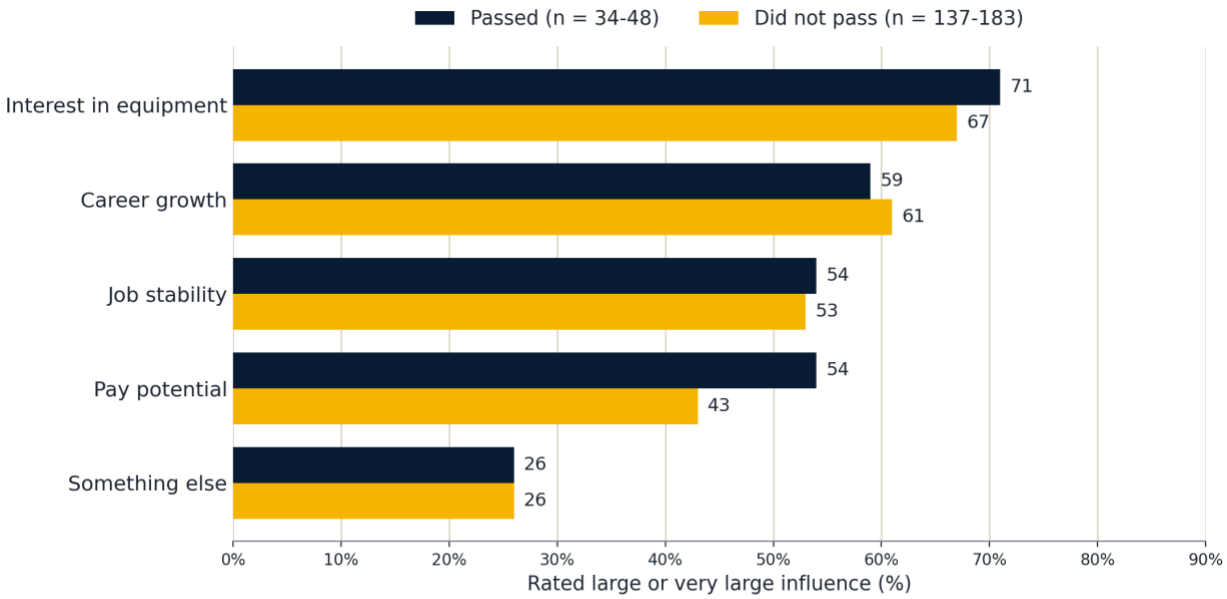
Open-ended barrier category	Representative verbatim responses
Passed one exam, failed or deferred the other	• "I passed the practical field test, which reflects the real skills needed to operate a crane. However, the written exam did not match that experience."
Testing logistics and infrastructure	• "Do not have a room in my house that fit the rules for the exam" • "I couldn't set up my profile on your website with my phone"
Employer or workplace coordination	• "My employer wouldn't let me retake the core exam" • "The company that [I was working for] paid for my training and required my license [but then they] closed down [before I completed the process]"
Test format or content concern	• "Core test questions didn't match what I was studying" • "The CCO exam in Spanish tested on cranes that did not pertain to the license"
No crane access to practice	• "Could not get a crane to practice for my practical exam" • "No hands on experience with crane made it hard to pass"
Perceived unfairness or integrity	• "The testing seemed like an attempt to just make money from people who need the license so I did not continue"
Still pursuing certification	• "I have not left the idea of becoming a crane operator. I just do not know the path to success."

5.8 Passers and non-passers compared

The survey identified 48 respondents who passed the examination and 188 who did not. Passers and non-passers rated the attraction factors at very similar levels (with the exception of pay potential), and interest in equipment was the leading factor for both groups. As seen in

Exhibit 28, this suggests that the difference between passing and not passing is unlikely to reside in what drew people to the occupation.

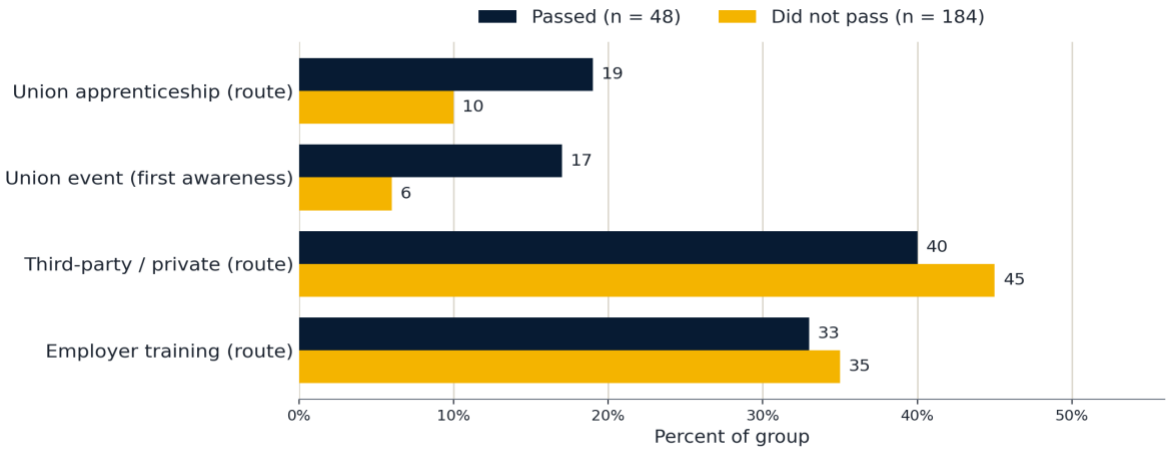
Exhibit 28. Attraction Factors Rated as a Large or Very Large Influence, by Examination Outcome



Descriptive comparison only. Motivation does not distinguish the two groups.

Training route and first awareness show the clearest directional signal in the entire comparison. Passers were roughly twice as likely to have trained through a union apprenticeship and roughly three times as likely to have first learned about the trade at a union event, as seen in Exhibit 29. These differences correspond to only nine and eight people, respectively, so they warrant careful interpretation, yet they are consistent with the possibility that union channels supply structure, mentoring, and connected experience that other routes may not.

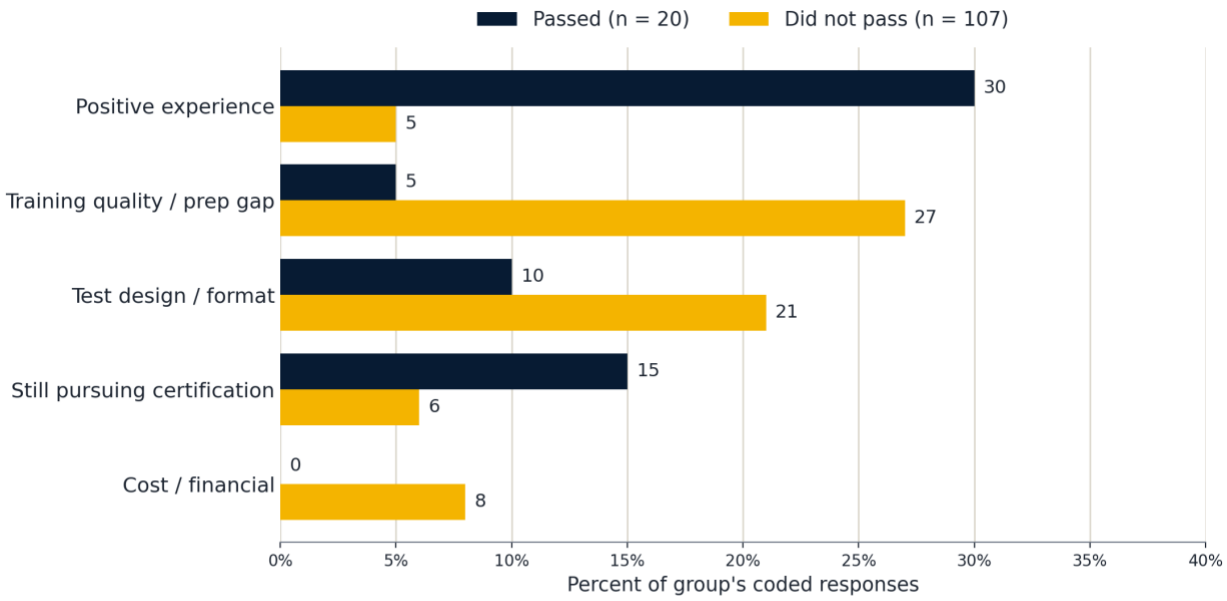
Exhibit 29. Union Training Route and Union-Event Awareness, by Examination Outcome



The free-text responses further differentiated the two groups, as seen in Exhibit 30. Positive experiences were coded in 30.0% of passers' responses, compared with 4.7% of non-passers' responses. Conversely, training-quality and preparation gaps characterized 27.1% of non-passers' responses, compared with 5.0% of passers' responses. Test-design concerns followed the same general pattern. Among passers, responses coded as still pursuing certification typically reflected a remaining component (i.e., passed the written, but not the practical).

> "The experience was amazing. The instructor knew exactly how to teach and get you to understand all the subjects. Made it real easy to pass the exam."
>
> *Survey respondent*

Exhibit 30. Coded Free-Text Themes by Examination Outcome



Matched free-text responses, n = 127. Free text separates the groups more sharply than any closed-ended item.

Together, these comparisons suggest that non-completion was not primarily a problem of weak interest in crane operation. Passers and non-passers were attracted to the occupation for similar reasons, but their experiences diverged after that interest was established. Differences emerged in how participants encountered the field, the training routes available to them, and whether they experienced training as supportive and aligned with the examination. Although these associations do not establish causation, they direct attention toward modifiable features of the certification pathway, rather than candidate motivation, as potential points for intervention.

Integrated Findings



6. Integrated Findings

Seven key findings emerged from the combined analysis of the literature, program and recruitment materials, survey responses, and interviews.

Finding 1. Attraction is genuine but does not guarantee completion

Interest in equipment, opportunities for career growth, job stability, and identification with skilled work attracted participants to crane operation. For many individuals, this interest remained even after they encountered difficulties, as 25 of the 28 interview participants indicated that they were still interested in becoming crane operators. These findings suggest that not completing the process should not automatically be interpreted as a loss of interest or a poor fit with the occupation.

Finding 2. The most visible loss occurs after training

Nearly half of the respondents who answered the training-progress question reported completing a program without passing the examination, compared with 5% who reported stopping during training. As noted in Section 5.2, this pattern should be interpreted cautiously given the cross-sectional, self-reported data. The results show that completing a training program and completing the certification process were separate milestones for many people in the sample.

Finding 3. Hands-on practice is the strongest recurring preparation signal

Insufficient hands-on training was the highest-rated barrier among survey respondents who answered the barrier questions, while training and preparation gaps were also the most common themes in the open-ended survey responses. Interviews reinforced this finding, with limited seat time emerging as the most frequently discussed barrier. Participants often distinguished between understanding how a task should be performed and having enough experience to perform it confidently under examination or workplace conditions. Participants' accounts also suggest that training was frequently delivered the same way to every enrollee, whether that person was an experienced worker adding a credential or a true beginner, and that candidates who did not pass had few options other than repeating the same course.

Finding 4. Difficulty with the certification process

Although examination difficulty appeared as a barrier in the survey, the interviews and open-ended responses showed that what candidates experienced as difficult was usually the overall preparation and certification process rather than the examination content itself. Participants described limited familiarity with equipment and controls, load-chart work they had not practiced enough, training that did not reflect the conditions under which they would need to perform, and logistical challenges involving testing sites, proctoring, scheduling, travel, retesting timelines, and cost. Treating these different experiences as a single category, as the survey's examination-difficulty item did, category makes it difficult to determine what type of support is needed and which organization is best positioned to provide it. Most of these mechanisms point to preparation and logistics rather than to the examination.

Finding 5. Recruitment frequently stops at awareness

Many of the reviewed materials introduced audiences to crane operation but did not clearly explain how to enter the field. Only 16 of the 87 sources provided a substantive realistic job preview, and approximately 70% did not clearly explain the training or certification process. These findings suggest that crane operation has strong and authentic appeal. However, public materials often presume that interested individuals already understand how the industry works. As a result, people without family or workplace connections may lack the guidance needed to identify training opportunities and connect a credential to employment.

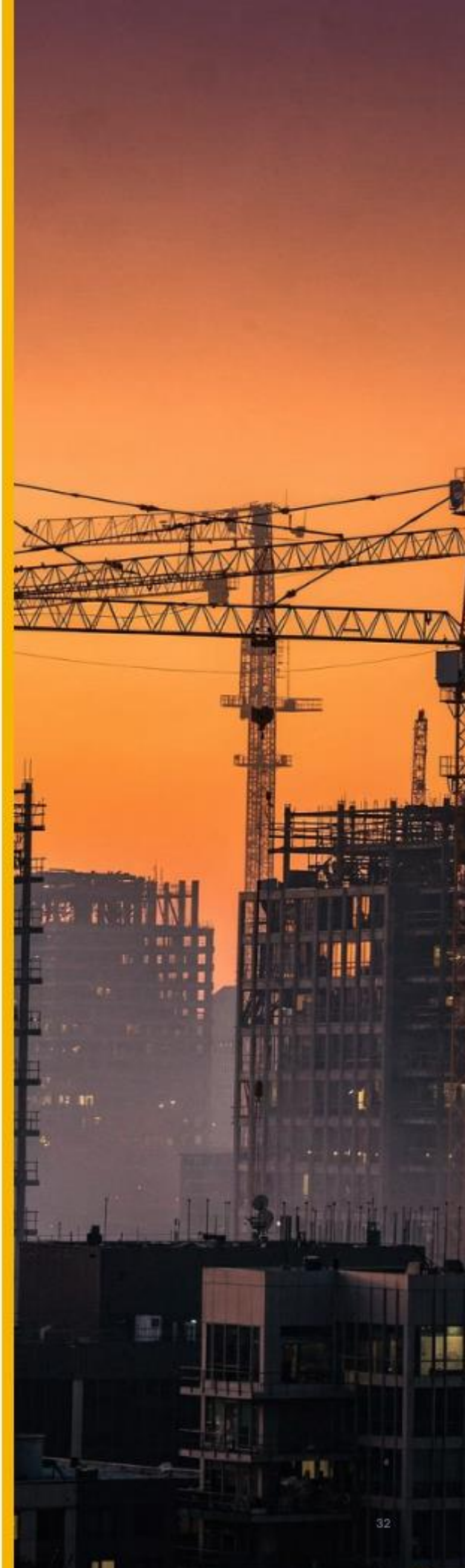
Finding 6. Different candidate groups may require different types of guidance

Some survey respondents reported passing an examination even though recruitment for the study focused on individuals with incomplete certification experiences. At the same time, the interviews showed that some participants pursued certification as an additional workplace capability rather than as part of a complete career change. Taken together, these findings suggest that the available data do not clearly distinguish among candidates who passed some examination components, earned certification later, pursued multiple certifications, or entered the process with different career goals. These groups are likely to need different information and support.

Finding 7. Trust and belonging signals warrant monitoring

Reports of hostile or discriminatory experiences and concerns about trust or integrity were less common than other themes, but their importance cannot be determined by frequency alone. The study sample was 94% men and may not fully represent individuals who left the field earlier, felt excluded, or chose not to participate. Candidates' trust and sense of belonging can be shaped by whether requirements, preparation materials, fees, and schedules are clear and consistent, and whether newcomers without established networks can access the same information and opportunities as those who have them.

Recommendations



7. Recommendations

7.1 Recommendation portfolio

Exhibit 31 outlines the four action areas, an early action associated with each area, and measures that would indicate whether the work is reaching people and improving the pathway.

Exhibit 31. Recommendations

Action area	Early action	Illustrative measures
1. Competency model and career pathway	Plain-language route maps embedded in school and adjacent-trade outreach	Reach, map use, referral source, training inquiries
2. Recruitment and selection	Realistic previews paired with explicit entry steps and broader representation	Content adoption, click-through, qualified inquiries, downstream persistence
3. Training providers and transfer of training	Skills pre-assessment with beginner and experienced tracks, supervised-practice benchmarks, and targeted remediation and seat-time options	Readiness, candidate experience, remediation update, examination outcomes, provider participation
4. Candidate support and re-engagement	Tailored navigation, support for retraining or refresher training costs, and mentorship pilots	Contact rate, opt-in, retest, completion

The four action areas are best understood as a complementary portfolio, with each addressing a different transition point while compensating for the limitations of the others. Making the pathway visible can improve the quality of entry decisions, but visibility alone cannot create supervised-practice opportunities. Retraining support can reduce financial barriers for some candidates, but it cannot correct inadequate preparation or improve access to distant testing sites. Recruitment materials can establish more realistic expectations while also connecting candidates to current, accessible resources and concrete next steps. A portfolio approach allows employers, training providers, testing organizations, and other stakeholders to address the portions of the pathway within their control while working toward shared outcomes.

7.2 Action Area 1. Competency model and career pathway

Occupational awareness in this sample arrived primarily through workplaces, employers, family, friends, and acquaintances, while school settings accounted for only 5.9% of first-awareness responses. Public recruitment materials frequently described the occupation without explaining a full route. School outreach was the intervention that interviewees named most often, in 14 of 28 cases. A visible pathway can reduce the advantage currently held by people who already know

someone in the field and can help newcomers ask better questions before they invest time or money. Exhibit 32 summarizes our recommendations for competency modeling and career pathways.

Exhibit 32. Recommendations for Competency Modeling and Career Pathways

Recommendation	Rationale and design note
Build a career-pathway map or competency model	Document entry routes, credentials, sequencing, and realistic timelines. Distinguish employer, union, and third-party options, and test the material with people who have no prior crane-industry connection rather than only with industry insiders.
Embed the map in high-school and community-college trade classes	Targets the awareness gap directly and responds to the recommendation most frequently mentioned by interviewees. Bring operator-led career content into career and technical education, community colleges, and workforce programs.
Use the map to recruit adjacent-trade incumbents	Riggers, millwrights, ironworkers, and drivers are already on site, and 48% of reviewed materials already speak to comparable trades. Frame certification as advancement or an added capability for workers whose jobs involve load handling.
Consider a staged, journeyman-style progression	Five of 28 participants suggested a rigger-to-oiler-to-operator sequence rather than an all-or-nothing route. Any such progression would be developed with certification partners and complement rather than replace required standards.

7.3 Action Area 2. Recruitment and selection

The recruitment review found limited use of realistic previews and weak pathway clarity, while survey respondents were drawn strongly by equipment, growth, and stability, and 16 of 28 interview participants described crane work as fitting who they were. Interest in equipment exceeded pay potential as a draw, 66% to 42%, and interviews consistently described pay as confirming a decision rather than initiating it. Public communication can preserve those authentic appeals while becoming more useful through the addition of realistic conditions, broader representation, and a complete next step. Exhibit 33 summarizes our recommendations for recruitment and selection.

Exhibit 33. Recommendations for Recruitment and Selection

Recommendation	Rationale and design note
Emphasize mastery, growth, and stability ahead of pay; develop recruitment materials with broader representation	Pay ranks fourth of five as a draw, so lead with equipment, craft, visible progression, and stable skilled work. Show authentic tasks, conditions, safety responsibilities, and physical or environmental demands rather than generic imagery. Also broaden who appears in imagery.

Recommendation	Rationale and design note
Sell the credential as added marketability	For many respondents, this is not a career change, and seven of 28 wanted a back-pocket skill rather than a new occupation. A concise message can explain how certification complements an existing role and makes a worker more marketable.
Review and better market realistic job-preview material	Only 18% of materials showed the actual day-to-day work. Review existing preview resources, such as those at mycranecareer.org, to ensure that they are current and well marketed, and pair every preview with a concrete next step into training or certification.

7.4 Action Area 3. Training providers and transfer of training

Inadequate hands-on training was the single most prominent rated barrier, at 30%. Condensed training with too little time on the crane appeared in 13 of 28 interviews, and 23% of written-in responses named training quality and preparation gaps. Participants' accounts suggest that many programs deliver the same content, in the same way and over the same number of days, to every enrollee, whether that person is an experienced rigger adding a credential or a true beginner who has never worked on or near a crane. According to the NCCCO Foundation, this one-size-fits-all approach may carry over from when certification was first introduced and most candidates were experienced operators documenting existing skills; today, many more candidates are true beginners seeking first-time knowledge and skills. When a candidate does not pass, the usual option is to retake the same course, which is costly and may not address the specific skills that candidate still needs. The objective should be to match preparation to each candidate's starting point and needs without reducing required standards or exposing secure examination content. Exhibit 34 summarizes our recommendations for training providers and transfer of training.

Exhibit 34. Recommendations for Training Providers and Transfer of Training

Recommendation	Rationale and design note
Pre-assess skills and route candidates to beginner or experienced courses	Responds directly to the one-size-fits-all pattern. A short pre-assessment of knowledge and operating experience at enrollment would let providers route true beginners to longer foundational courses with more seat time and experienced workers to shorter, credential-focused courses. The pre-assessment would be developed and administered by training providers and kept separate from the certification examination.
Consider setting a recommended minimum amount of hands-on training time before testing	Addresses the top-rated barrier directly. Any benchmark should be scaled to the candidate's starting level, as identified through pre-assessment, and validated with training providers before broad promotion. It should be framed as guidance rather than a guarantee of passing.

Recommendation	Rationale and design note
Promote published examination domains and reference materials in curriculum guidance	NCCCO already publishes examination domains, content outlines, and reference materials. Continuing and promoting that practice, and helping providers translate these materials into the practical skills candidates need to demonstrate (including operating on varied equipment and course layouts and using current load charts), supports skill development rather than teaching to specific test.
Promote the vetted provider and practical-test-site directories	Maintain and actively market a searchable directory with transparent inclusion, currency, accessibility, and non-endorsement criteria, and invest in distribution and search visibility so that candidates can locate it.
Develop a train-the-trainer and transfer-of-training model	Standardized materials for trainers could improve consistency across providers and support the curriculum-alignment recommendation above.

7.5 Action Area 4. Candidate support and re-engagement

The largest status group completed a program without passing, a lack of mentorship was the second-highest rated barrier at 21.9%, 10 of 130 written-in respondents said they were still pursuing certification, and 25 of 28 interviewees remained interested in becoming crane operators. Near-completers may constitute a high-leverage group because they have already invested in the pathway and may require a specific next step rather than a new awareness campaign. Cost frequently became binding after an unsuccessful attempt, largely because of the cost of retraining, travel, and renewed equipment access rather than the examination fee itself. Exhibit 35 summarizes our recommendations for candidate support and re-engagement.

Exhibit 35. Recommendations for Candidate Support and Re-Engagement

Recommendation	Rationale and design note
Re-engage candidates who passed one component	With appropriate consent and privacy safeguards, pilot tailored navigation for partial passers and recent non-passers, distinguishing partial passers, people delayed by logistics, and those who have chosen another path.
Lower the cost of retraining after an unsuccessful attempt	The examination fee is a small part of what another attempt costs; the larger costs are repeat training, travel, and renewed access to equipment. Test options such as discounted refresher seat time, equipment-access partnerships with employers or unions, or hardship assistance for retraining so that a single failure does not end the pursuit. Define eligibility and success measures before launch, and do not market support as a guarantee of success.
Pilot mentorship	Addresses the second-highest rated barrier and imports the structured support that union apprenticeships supply. Mentorship should have a

Recommendation	Rationale and design note
	defined purpose, appropriate supervision, and safeguards for both mentors and participants.
Consider a Part 2 on retention and the certification-to-employment gap	This study stops at certification, and interviewees raised what happens after the credential. A follow-on study could examine the gap between certification and stable employment.

For additional considerations, see Appendix B.

Limitations, Future Research, & Conclusion



8. Limitations and Future Research

A key strength of this study is its use of multiple sources of evidence to provide a more complete picture of the points at which individuals encounter challenges as they move from initial interest through training, certification, and employment. The consistency of several findings across the literature review, program and recruitment materials, survey, and interviews increases confidence that these issues warrant attention, while the differences across sources help clarify when and how they may arise. At the same time, the study was not designed to estimate how common these experiences are nationally or to determine whether any single factor directly causes candidates to continue or stop. The source reviews also reflect only the information available through specific searches and databases at the time they were conducted.

8.1 Limitations

Together, the survey, interviews, and source reviews identify recurring transition points and provide insight into participants' experiences along the pathway. However, the research design does not support national prevalence estimates, causal conclusions, or precise comparisons across all candidate groups. Counts and percentages should therefore be interpreted as descriptive of the participants and materials included in this study, while interview themes should be treated as evidence of recurring experiences and possible mechanisms rather than estimates of how frequently those experiences occur across the broader population.

Several specific features of the design bound the findings. The outreach population was identified through NCCCO administrative records of people who had expressed interest in crane certification, so it may miss the perspectives of people earlier in the crane-career pipeline. Survey and interview participants were not randomly sampled, the survey data are self-reported and cross-sectional, and interview volunteers were self-selected. Theme counts therefore describe cases rather than prevalence. The demographic sample was predominantly men and White/Caucasian, which limits insight into the experiences of women and other underrepresented groups. Finally, the recruitment-material and program reviews are time-bounded snapshots, affected by search visibility, platform algorithms, and the currency of the underlying listings.

8.2 Future research

The study points to several lines of future work. The most direct is a closer examination of the training-to-certification transition itself: studying partial passers, retest decisions, and the time that elapses between training and the separate examination components , and evaluating whether skills pre-assessment, tiered beginner and experienced courses, and targeted remediation improve readiness. A second line would test recruitment messages with people who have no prior connection to crane operation, since the current awareness channels favor those already networked into the trade. A third would examine the relationship among supervised-practice exposure, readiness, and certification outcomes, which this study identifies as the strongest recurring preparation signal but cannot measure directly. Two further directions extend beyond the current scope: studying the relationship between certification and public safety, and

investigating the factors that influence retention once candidates enter the workforce. The latter would be the natural subject for Part 2.

9. Conclusion

This study suggests that the central challenge is not a lack of interest in crane operation, but the difficulty some individuals experience as they move from initial awareness through training, examination, certification, and employment. Participants were drawn to the equipment, the opportunity to develop a specialized skill, the potential for career growth, and the stability associated with skilled work, and many remained interested even after encountering a setback. Within this study sample, stalled progress was most concentrated after training, when 116 of 240 respondents reported completing a program without passing the examination, compared with 12 respondents who stopped during training. Although this pattern does not establish why candidates did not pass or continue, it identifies the transition from training to certification as an important point for additional support and study.

Across the survey and interviews, limited hands-on practice emerged as the most consistent preparation concern, but it rarely operated alone. Candidates also described limited mentorship, training that did not account for their starting level of knowledge and skill, few options other than retaking the same course, testing-site and scheduling difficulties, retraining and retesting costs, and uncertainty about what to do after an unsuccessful attempt. These findings show why non-completion should not be treated simply as a lack of motivation or reduced interest. Candidates who need additional supervised practice require a different response from those whose progress is limited by cost, travel, family responsibilities, testing logistics, or an unclear connection between certification and employment.

The findings also indicate that recruitment can do more than generate awareness. Public materials can highlight the appeal of crane operation while also explaining the realities of the work, available training routes, certification requirements, expected costs and timelines, and the next step an interested person should take. Providing this information is particularly important for people who do not have an employer, family member, union contact, or personal connection to help them understand how to enter the field.

No single organization controls every stage of this process, which makes a coordinated response especially important. The NCCCO Foundation can make entry routes easier to understand, strengthen recruitment and realistic job-preview materials, support training matched to each candidate's starting point with clearer expectations for supervised practice, and pilot targeted assistance for candidates who remain interested but have stalled near certification. Training providers, certification and testing organizations, employers, unions, schools, and workforce organizations will each need to contribute within their respective areas of responsibility. This coordination is not intended to reduce certification standards, but to help candidates understand those standards, prepare appropriately, and avoid preventable obstacles that do not reflect their ability or commitment.

Because the study was based on a nonrandom, predominantly male sample and relied on cross-sectional and self-reported data, its recommendations should be implemented as carefully measured pilot efforts rather than universal solutions. Each pilot should examine who participates, which barriers are addressed, whether candidates move to the next step, and how outcomes differ across training routes and levels of prior experience. The opportunity identified by this study is not simply to attract more people to crane operation, but to create a clearer and better-supported

process through which genuine interest can lead to informed entry, adequate preparation, certification, and ultimately employment.

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Appendix A.

Sources for Barrier and Retention Categories

Stage	Barrier / Retention category	Illustrative mechanisms	Representative sources
Entry	Training process	Varied routes, program length, equipment access, sequencing, and supervised experience	CareerExplorer (n.d.); Conway & Gerber (2009); Crane Equipment Guide (n.d.); George et al. (2016); Herzenberg et al. (2018); Nordahl et al. (2025); Reddit (n.d.-c); Srikanth et al. (2024); Stefek et al. (2022); Wang et al. (2025)
Entry	Unclear pathway	Ambiguity about credentials, next steps, timelines, and connection to employment	Caraway (2020); CareerExplorer (n.d.); Heavy Equipment Forums (n.d.); Incident Prevention (n.d.); Reddit (n.d.-a); Reddit (n.d.-b); Reddit (n.d.-d)
Entry	Upfront cost	Cost of training, credentials, tools, travel	Conway & Gerber (2009); Herzenberg et al. (2018); Lutte (2014); Payne (2020); Srikanth et al. (2024)
Entry	Gender norms and belonging	Variations in who perceives the work as available to them, as well as access to networks and mentoring	Curtis et al. (2022); Gatti & Julien (2025); Kelly et al. (2015); Marintseva et al. (2022); Wagner & Kulwiec (2020)
Retention	Workload and fatigue	Long hours, distant travel, unpredictable schedules, cumulative strain, and work-life conflict	Altalhoni et al. (2025); Dasgupta et al. (2012); Gekara et al. (2019); Harrison & Pierce (2009); NCCCO Foundation (2024); New Heights Insurance Solutions (n.d.); Sadeghi & Zhang (2024)
Retention	Compensation and supervision	Pay and benefits, feedback, support, and quality of supervision	Clarke & Herrmann (2007); Elbashbishy & El-adaway (2024); Harrison & Pierce (2009); Ho (2016); Kelly et al. (2022); Srikanth et al. (2024)

Appendix B.

Additional Considerations

Several additional recommendations emerged that do not fit neatly within the four primary action areas but warrant consideration because they address points of confusion, coordination, access, and fairness across the pathway. The strength of evidence supporting these ideas varies. Some reflect concerns raised across multiple interviews, while others originated with a single participant and should be treated as options for exploration rather than established priorities. This appendix presents each recommendation alongside its evidentiary basis so that the Foundation and its partners can assess feasibility, identify potential owners, and determine where additional investigation may be needed before implementation.

Additional recommendation	Basis and note
Clarify which licenses are required and where	Addresses jurisdiction-specific confusion such as New York City licensing. Public materials could summarize where additional local licensing applies.
Add a short work sample to hiring processes	Raised by a single interviewee. A brief 15- to 30-minute work sample could supplement employer selection, and it would be evaluated separately from the certification examination.
Provide tools that bring employers into the loop	Interviews described scheduling breakdowns and withdrawn retake support. Provider-facing outreach materials could help close the loop with employers.
Support fair treatment in training and entry to employment	Emerged in at least three interviews. Options for exploration include childcare at training sites, bias training, and consistent use of existing credential-verification tools, such as Verify CCO, when making hiring or work-assignment decisions. Applying the same verification process to everyone can help ensure that individuals who earn and maintain required credentials are not disadvantaged by inconsistent enforcement of those requirements.