Technology and Journalism: The Experience of Recent Graduates from Two Canadian Journalism Schools

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Abstract

Recent graduates of two Canadian journalism schools were surveyed on their attitudes toward what constitutes useful technology in journalism. Both those working in journalism and those in communications felt a wide range of innovative technologies were useful and would use them more in their jobs in an ideal world. A narrower range was used in practice. Journalism respondents favoured use of tools that could be applied to traditional tasks such as finding stories. Those in communications were more likely than journalists to perform tasks such as collecting and organizing data in a spreadsheet, although the basics of data journalism are taught in both programs. The results raise questions about the appropriate mix of technological instruction in journalism curricula.

Keywords: journalism, education, technology, innovation

Résumé

Technologie et journalisme : L'expérience de diplômés récents de deux départements de journalisme canadiens

Un sondage effectué parmi les étudiants récemment diplômés de deux départements de journalisme canadiens avait comme but d'évaluer leur attitude sur ce qui constitue une technologie utile en journalisme. Et ceux qui sont employés comme journalistes et employés en communications estiment qu'un grand éventail de technologies innovantes est utile et ils les utiliseraient plus fréquemment dans un monde idéal. En réalité, c'est un éventail plus restreint qui est utilisé. Les journalistes montraient une préférence pour les outils qui les aident dans les tâches traditionnelles, telles que la recherche d'histoires. Ceux en communications sont plus aptes à les utiliser pour recueillir et organiser les données dans des feuilles de calcul, ceci malgré le fait que l'enseignement des éléments de base du journalisme des données fait partie de leur formation dans les deux départements. Les résultats de ce sondage pourraient mener éventuellement à une réévaluation du poids accordé à l'instruction technologique dans les programmes de journalisme.

Mots clés : journalisme, éducation, technologie, innovation

INTRODUCTION

Graduates of journalism programs begin their working lives in a world awash in digital technology and data. Since the popularization of the internet and the World Wide Web in particular, many commentators have identified the importance of technological fluency among journalists as a means to tell stories differently, reach new audiences and potentially develop new business models. The ability to use different technologies is one dimension of the concept of innovation. Journalism educators need to prepare students for this world but with time in curricula limited, they always face the question of what to teach and how much.

In this empirical study, we offer an analysis of technology use among recent graduates. A group of recent graduates from two leading Canadian university-based journalism schools was surveyed to determine what technologies the graduates are using early in their careers and for what tasks, as well as technologies they believe would be useful and that they would use more if they could. Both programs offer undergraduate and master's degree programs. Graduates from both the undergraduate and graduate programs were invited to participate. We identify two different groups of survey respondents: those who are working in journalism; and those who are working in other communications-related fields. This comparative data provides insight into the state of technological innovation in entry-level journalism positions.

JOURNALISM AND TECHNOLOGY

Some level of technological competence has long been associated with journalism work. Dooley (2007) writes that different technologies have long been "part of a complex mix of conditions affecting the speed with which news is delivered, how and why certain new forms of journalism have developed, and how and why certain extant forms of news have changed and others have disappeared from use" (p. 25).

But Dooley notes that the "technologies most associated with journalism — the printing press, telegraph, camera, radio, television, computer, and Internet — were invented for purposes that had little to do with the news" (p. 61). Furthermore, Dooley says that the lesson from history is that news publishers rarely change the way they do business unless they have no other choice. Ryfe (2012) described U.S. newspaper newsrooms as places where new journalists are quickly socialized into the accepted habits of the profession, which is resistant to change and in which even a young reporter, keen on trying new things "will find himself doing journalism mostly in conventional ways" (p. 24). The traditional forms of journalism typical of the 20th-century newspaper were, according to Ryfe, appropriate for the age of 'mass media,' where information was relatively scarce and journalists acted as gatekeepers. But this model may not be a good fit for the modern world. "Dressed up as a professional filter for a mass-mediated ball, journalism finds itself dancing to the tune of an increasingly networked world" (p. 36).

The widespread adoption of the internet and of social media platforms are just two of the more recent examples of the many technological changes to which journalists have had to adapt. But it has come at a cost, as digital platforms hollowed out formerly lucrative advertising revenues. The decline of many news outlets in Canada and the U.S., particularly newspapers, has been well documented (Lindgren, n.d.; Pew, *State of the Media reports*, 2014-2018).

The move to digital journalism has also put pressure on journalism programs to offer training in a broad range of digital skills so they can help produce multiskilled journalists who can perform a "greater variety of tasks – including those that were traditionally performed by others (whether designers, marketers, publishers, or editors)" (Deuze & Witschge, 2020, p. 32).

These multiskilled journalists may be more employable, as job advertisements increasingly highlight multimedia skills (Wenger et al., 2018). Journalism students may also perceive the importance of technology to their own career prospects. A study in Britain and the Netherlands (Singer & Broersma, 2019) found that journalism students felt there would be more opportunities awaiting those who are more technically savvy. Multiskilled, technologically savvy journalists have also been cast in 'idealized' ways, seen in

terms of people who will "emerge, thrive, and hopefully bring profits back into newsrooms" (Creech & Mendelson, 2015, p. 151).

Prescriptions for what kind of skills are needed have varied widely but include areas as relatively complex as writing HTML and computer code. Royal (2014) posed a series of questions to journalism educators about how much their programs were oriented towards technological competence: "Do you know how to: Make a basic website from scratch using HTML/CSS? Register a domain and get web hosting? Customize a blog platform like WordPress? Do basic video and audio editing?"

The need for journalists to have high-level skills has also been identified by other scholars. "If there are two significant language barriers that journalism needs to traverse, one is statistics and data skills and the other is technical aptitude. Journalists should learn to code … [e]ven for journalists who never end up writing a line of code meant for daily use, basic technology literacy is as important a skill as basic business literacy" (Anderson et al., 2013, p. 38).

Writing computer code has also been highlighted by others as an important addition to a journalist's skillset. Folkerts et al. (2013) argue, "A number of other research and analytic skills can usefully be adapted to the work of journalists, including ethnography, performing literature reviews, and writing computer code" (p. 66).

This potentially places a heavy burden on journalism educators and Lynch (2015) argued that the academic system is too rigid to help support the development of 21st-century journalists. Nevertheless, in a series of interviews with deans and directors of U.S. universities, Richards and Fitzpatrick (2018) identified "five core elements that stood out as essential to the creation and sustainability of cultures of innovation in JMC schools and colleges," including considering whether the "curriculum integrate(s) new technologies and emerging issues" (pp. 142-143).

There has long been some debate about how much technical instruction students actually need, as well as a tension between technical instruction and the development of 'softer' skills such as critical thinking and interviewing. Lynch (2007) argued that journalism programs should stop teaching software, because students come to journalism school knowing it already (or knowing how to learn it), but in a study about teaching social media, Bor (2014) concluded that "millennial students still require some instruction on using web-based platforms" (p. 252).

On the other hand, many scholars warn that digital skills, while important and necessary, do not constitute professional journalism (Folkerts et al., 2013). Zelizer (2019) argued the tendency to cast journalism as this set of skills may explain why "much of current news falls short in covering the multiple political, economic and social ills that plague today's increasingly dark times" (p. 346). Reardon (2016) warns that skills will relegate the value of intellectual debate to second fiddle. Other critiques have focused on broader social issues. "In the research on journalistic innovation, there is a striking lack of attention to socioeconomic inequities in digital news participation and to audiences underserved by digital initiatives,'' write Creech and Nadler (2018, p. 188).

Nevertheless, there is no doubt that technology has been an integral part of journalism since the printing press and before, something that is not likely to change. Deuze and Witschge (2020) highlight four major trends that suggest a shift towards a more dynamic notion of journalism. "These four trends are: a concurrent reorganization of working environments; fragmentation of news work; an emerging redactional society; and the ubiquity of media-making technologies. These trends point to a more networked (rather than an institutional) perspective of the journalist" (p. 31).

The role of social media in news work, for example, has been studied by many scholars. Hermida (2010) described Twitter as an "awareness system" and noted "it can be seen as a system that alerts journalists to trends or issues hovering under the news radar" (p. 302). But some have found that the platforms are often used to perform relatively traditional tasks. Powers and Vera-Zambrano (2018) interviewed journalists in the United States and France and found that while there were some differences in how journalists in the two countries used social media, "[i]n both countries, social media are used to accomplish routine tasks: French and US journalists alike report using such tools to collect information, monitor sources, and develop story ideas" (p. 2729). Larsson and Ihlebæk (2017) surveyed

Norwegian journalists on the use of a number of social media platforms. They found the journalists used Facebook the most, and social media were used primarily for traditional journalistic tasks such as gathering information and "spread[ing] content," with younger journalists more likely to use these tools (p. 699).

In a 10-year longitudinal study of reporting practices, Reich (2013) used interviews with Israeli journalists to reconstruct where story ideas and information came from and found "remarkable stability," with the telephone the dominant news gathering tool. He found that new technologies were either marginal in their uptake or were displacing older technologies "in the same cluster of textual technologies. More specifically, the pager and the fax made way primarily for e-mail." Newer technology such as social media was more likely to be used during the "news discovery" than during the "information gathering" phase of reporting (p. 424).

At the same time, Stalph and Borges-Rey (2018) noted that the practices that have come to be known as 'data journalism,' for example, were failing to expand in a significant way beyond mainstream news organizations in large urban areas, "which calls into question the ability of data journalists to hold the powerful to account at local level" (p. 1079).

The ability to leverage social media platforms effectively or engage in more computational, data-oriented tasks are just a couple examples of how 'innovation' might be manifest in journalism work, though innovation can also be associated with new story forms or more participatory-oriented news work. However, 'innovation' is often characterized as journalists harnessing new technologies, which may be related to cultural changes in news work. One ethnographic analysis of news startup manifestos in the U.S. (Carlson & Usher, 2016) found that while those manifestos "generally stayed close to the legitimizing conventions underlying journalism, efforts to differentiate themselves as technologically sophisticated led to an embrace of the core conventions of startup culture" (p. 574), which emphasizes experimentation, prototyping, and an appetite for change.

Steensen (2009) identified five factors highlighted in previous research that constitute a grounded theory of innovation in online newsrooms: Newsroom autonomy; newsroom work culture; the role of management; the relevance of new technology; and innovative individuals. According to Steensen, "studies of innovation in new media tend to highlight structural factors of media organizations rather than instances of individual practice as being most decisive for processes of innovation" (p. 822). Steensen argues that "[a] question therefore arises of whether individual practice has been downplayed as a determinant for innovation in online newsrooms" (p. 822). In the context of this individual practice, the ability to work with technology is a contributing factor and is related to the 'relevance of new technology,' which Steensen describes as whether technology is "perceived as relevant, i.e. efficient and useful" (p. 833). But Steensen also identified friction points around technology usage, noting that "technical restraints were mentioned as the direct cause of why new features were discarded" in the Norwegian newsroom that was observed (p. 830). Steensen's study describes an unstable and complex content management system (CMS) in the newsroom as well as deliberations over whether to develop interactive features in Adobe Flash, a complex, programming-based environment that has since become obsolete. (A Flash developer was never hired in the newsroom.)

A great deal of theoretical work has been done in recent years around innovation in journalism, in which different production practices are key factors (García-Avilés, 2021). As highlighted by Steensen, some of those practices rely on 'useful' technologies that journalists can harness in order to produce work for a digital landscape.

The purpose of this study is to contribute to an empirical understanding of what currently constitutes 'useful' technology and to explore possible friction points in technology usage. Journalism educators have long been urged by some scholars and commentators to enhance their technology-based offerings to better prepare program graduates for increasingly digital work (Mulligan, 2012; Anderson et al., 2013; Bor, 2014). This study will add to an understanding of what that work looks like for young journalists in Canadian newsrooms.

At the risk of stating the obvious, the process of preparing young journalists to employ new or emerging technologies for news work will

not be static; what constitutes 'new' or 'relevant' technology will change over time. Even within the domain of social media, change is a given. According to Pew (2021), while regular usage of social media in the U.S. appears to be dropping for those aged 18 to 29, 21% of U.S. adults say they use TikTok, a relative newcomer to the social media mix, and one which is more visual than platforms such as Twitter.

Using a variety of survey analysis methods, we explore the use of and attitudes towards technology in news work. We also look at responses from two separate groups, those who reported working in journalism, and those who reported working in communications. It is well established that journalism program graduates tend to pursue career paths in communications industries unrelated to journalism. A British study (Hanna & Sanders, 2007), for example, found that only 53% of graduating students said they were "sure" they wanted to work in journalism. (See Hanusch et al., 2015, for a more global review.) This presents an opportunity to compare the responses from those working in journalism with those working in other fields. This comparison will provide an additional measure of the state of technological innovation in contemporary news work.

The development of the survey used in this study was guided by four research questions:

RQ1: What kinds of technologies do recent journalism graduates evaluate as being useful for the practice of journalism?
RQ2: To what extent are they employing useful technologies as a regular part of their work routines?
RQ3: Would they use the technologies more in their work in an ideal world?
RQ4: If they say they would useful technology areas more in their jobs in an ideal world, what factors help explain why they do not?

METHODS

This study is based upon survey data gathered from recent graduates of two Canadian journalism programs. Prospective respondents were selected who had graduated from their programs one-to-two years prior to the survey.

Invitations to complete the survey, which was developed using SurveyMonkey, were sent by email to 290 individuals. Recruitment emails indicated that survey responses would be anonymous and that while some demographic data would be collected, no names or IP addresses would be gathered. Questions were a combination of Likert-scale, single-item selection and open-ended text responses (see Appendix A). The names of respondents were not collected, but general demographic details such as age, gender, and racial identity were. Due to the relatively small numbers, particularly of racialized respondents, we have not associated demographic details with the responses, but do report on the general demographic breakdown below. The raw data has been kept secure consistently by the two researchers, and has not been shared with any third parties. Response data was analyzed using Tableau and MySQL and the results were compared to one another to ensure consistency.

The study was conducted under ethics approval granted by the research ethics board of a large Canadian university. The survey was in the field between May and July, 2020. There were 122 responses, for a response rate of 42%. Of those, 55 indicated they had graduated from the larger of the two programs, and 40 from the smaller. Another 27 respondents declined to indicate their program. As those who did respond were not a random sample of the overall pool of graduates but could choose whether to respond, it is not possible to estimate how representative the results are compared to what would have been obtained had all responded. The results, therefore, should be seen as representative of the group that answered the survey and not generalizable to the pool of all journalism program graduates in the two years, or indeed to all young journalists.

We examine a range of different technology applications through analysis of different questions addressing the following issues: whether a technology application was perceived to be useful in the context of news work; the frequency with which it is used in the workplace; and whether it would be used more or less under ideal conditions. We then examine some of the reported reasons that the technology applications are not used more frequently.

The questions about technology were asked in two different ways. One was more general, in order to gauge whether respondents thought a technology area could be useful without presupposing how it might be applied to news and information work. For example, respondents were asked whether they thought 'databases' are useful for journalism work, which does not presuppose the different ways in which a database might be used to support that work. Nor does it suppose a particular database platform (i.e. MySQL vs. Microsoft Access).

On the other hand, when asking about current technology practices in day-to-day work, questions were asked in more specific ways so that they might be more directly relatable to that work. These questions were originally developed in 2018 (though slightly revised since) and pilot tested on six recent journalism graduates at the time to help ensure relevance. None of those graduates was invited to participate in this survey.

Responses to agree/disagree questions may be subject to acquiescence response bias (see Encyclopedia of Research Methods, 2008). Two methods have been employed to try to minimize this bias. First, all respondents are anonymous, which should reduce any desire on the part of respondents to be motivated to agree with or please the study authors. Second, research has found that 'satisficing' is more likely when respondents' ability and motivation is low and when question difficulty is high. While the study authors cannot attest to the respondents' motivation, the questions have been framed using simple and straightforward language. Furthermore, since the respondents are all graduates of a university-based journalism program and employed in journalism and communications fields, we hypothesize that their ability – and their willingness to offer independent, critical assessments – are reasonably high.

Throughout this analysis, we acknowledge that the issue of whether Likert-scale data can be treated as interval or ordinal data is somewhat controversial (see Wigley 2013; and Wu & Leung 2017). However, these values are assigned only for comparison and not for any formal statistical purposes.

RESULTS

Out of the whole pool of respondents, 64 identified as female, 27 as male, and 31 either did not indicate their gender identity or indicated an identity other than male or female. Sixty-four indicated they were of white ethnic or racialized background, and 31 indicated other identities, while 27 declined to answer this question. Eighty-seven respondents were under 30 years old, seven 30 or older and 28 did not indicate their age.

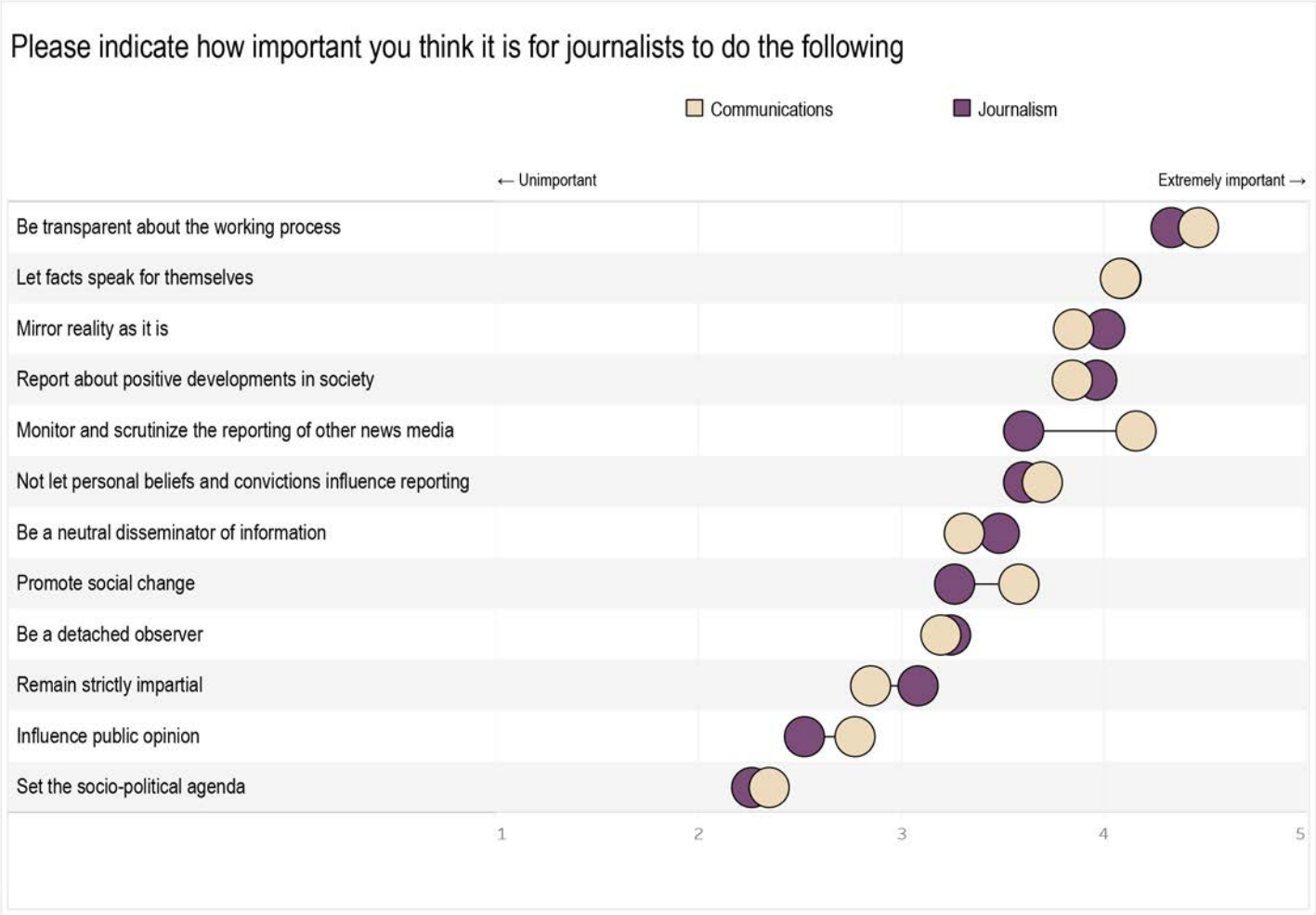
Respondents were asked whether they are working in areas that use the skills acquired in their journalism programs. In total, 14 indicated that they were not, leaving 108 who indicated that they were. Of the 14 who reported not working in a related field, seven indicated that they were continuing their education. This might suggest an encouraging picture of employment prospects, though it might also suggest that the nature of the survey is biased in favour of those who are working in their fields.

When respondents were asked what field they were working in, possible responses included check boxes for journalism, communications, public relations, etc., plus an open-ended text field. Some respondents indicated multiple, overlapping fields. For example, one respondent checked the boxes for 'advertising,' 'communications,' 'journalism,' and 'public relations.' Respondents with multiple, overlapping fields have been excluded from the analysis, leaving 103 respondents who indicated a particular field. Of those, 62 reported working in journalism, 37 in communications and public relations and four in "other" areas (including education and research). Only the 99 respondents who indicated either journalism or communications are included in the analysis.

In order to try and establish that the two groups did not have wildly different views on the role of journalism in society (despite all having graduated from two broadly similar programs), all respondents were asked to rate a series of different values on a Likert scale from 1 (unimportant) to 5 (extremely important).[1] In Fig. 1 these responses are represented as averages of the numerical values.

1 This question was developed by the European Journalism Training Association: https://www.ejta.eu/publications.

Figure 1



As illustrated in Fig. 1, the values of transparency, neutrality, and impartiality were more or less equally ranked and valued by respondents working in journalism and in communications.

Those working in communications attached a somewhat higher importance to promoting social change and influencing public opinion than the journalism group, though the largest point of divergence was on the issue of monitoring and scrutinizing other news media. However, these responses suggest that both the journalism and communications groups have a shared conception of some of the functions and values of journalism despite having found employment in different fields.

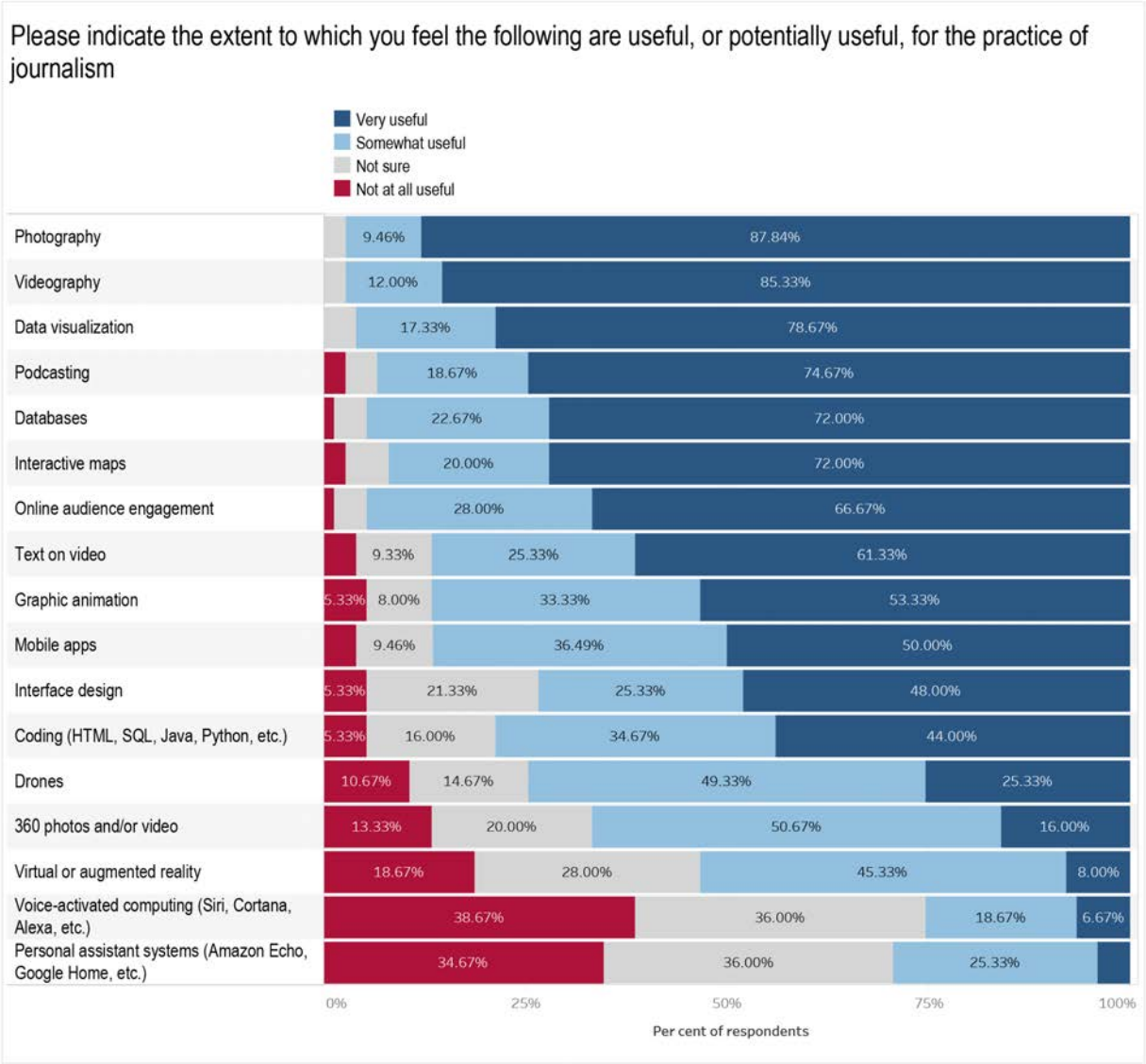
USEFULNESS

Recent graduates were asked to indicate whether they felt that different technology areas were useful for doing journalism work. Responses were provided on a Likert scale from 1 (not at all useful) to 4 (very useful). As illustrated in Fig. 2, a large proportion of respondents indicated that many of the technology areas were either somewhat useful or very useful.

Photography was seen as very useful by 88% of respondents, followed by videography (85%) and data visualization (79%). Of those three areas, none of the respondents indicated that they were not at all useful.

Some of the more advanced technology areas were also rated as being useful. For example,

Figure 2

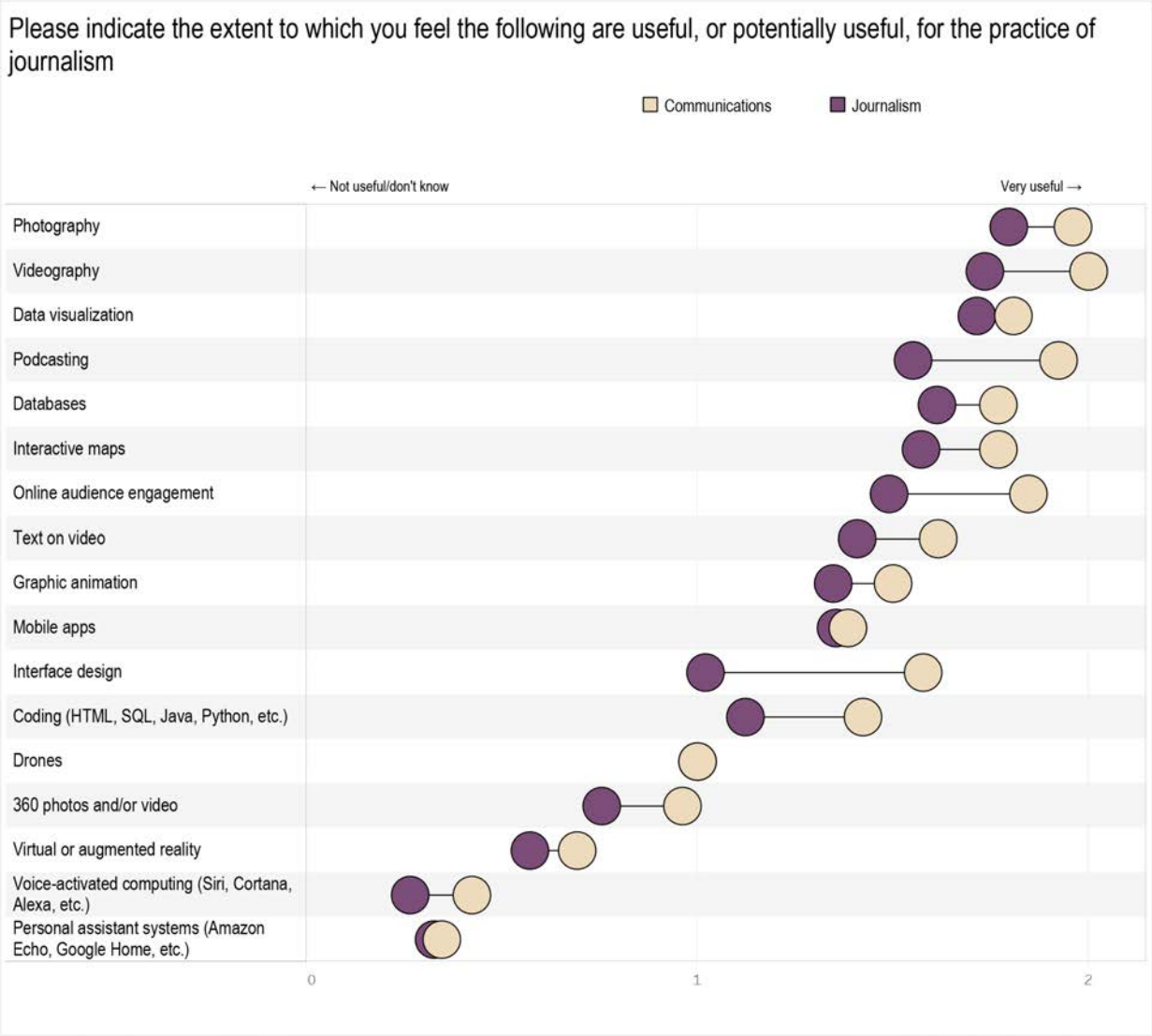


360-degree photography and video was deemed to be somewhat useful by just over 50% of the program graduates and as very useful by 16%. Virtual and/or augmented reality garnered somewhat lower numbers but just over half of the respondents deemed it to be either somewhat or very useful.

But this broader picture conceals differences between the journalism and communications groups in the extent to which they see these areas as useful. In Fig. 3 the responses have been assigned the following values: 0 for 'not at all useful' and for 'not sure'; 1 for 'somewhat useful'; and 2 for 'very useful.' (The purpose of this value assignment is to compare responses along the two 'useful' measures.)

While the overall ranking of the technology areas between these two groups is quite similar, some differences are notable. For example, the communications group almost universally viewed the different areas as more useful but the differences were much smaller in the areas of data visualization and mobile apps. Perhaps somewhat puzzlingly, the communications group was more likely to view podcasting as useful for the purpose of journalism, despite the popularity of the medium (Newman et al., 2020) and its similarity to traditional radio broadcasting. This may simply reflect the non-random nature of the survey, making it difficult to reach absolute conclusions on the relative proportions of answers given by the two groups. (Note that the number of respondents who indicated that the bottom three areas are somewhat or very useful is relatively small, so the

Figure 3



responses on these items should be interpreted with caution.)

USING TECHNOLOGY MORE

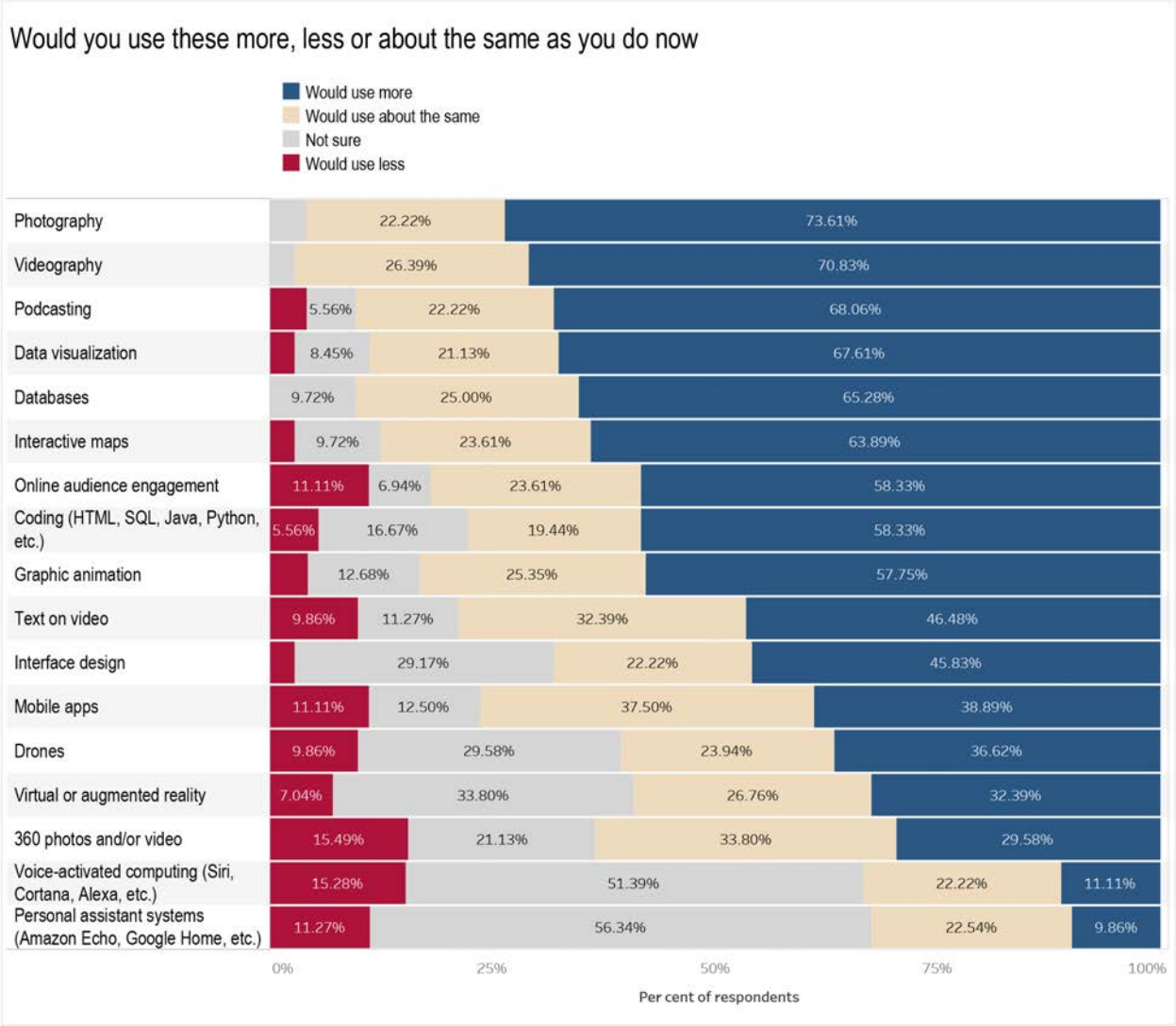
As one way to ascertain whether respondents have some level of enthusiasm for embracing technology-related tasks, they were asked whether, in an ideal world, they would use these same technology areas more or less for their own work (whether in journalism or in communications).

As illustrated in Fig. 4, respondents appeared to be less enthusiastic about some of the 'leading-edge' areas, including virtual/augmented reality, 360-degree photos/video, voice-activated computing, and personal assistant systems. (As illustrated in Fig. 6, it appears that almost no respondents are actually using these, so we would suggest that the 'would use about the same' response effectively means they will continue not using them. However, a rough majority of respondents were "not sure" about the final two, which might suggest that the respondents just haven't made up their minds about them.)

As illustrated in Fig. 5, there appears to be a desire among both the journalism and communications groups to use the technology areas more, particularly in those areas generally rated as being the most useful. (In order to avoid having 'about the same' and 'not sure' responses skew the 'more' and 'less' responses, numeric values have been assigned as follows: Would use more: 1; Would use about the same: 0; Not sure: 0; Would use less: -1.)

In this case, the respondents in the two different groups appear to have more synchronicity. Those working in communications express a

Figure 4



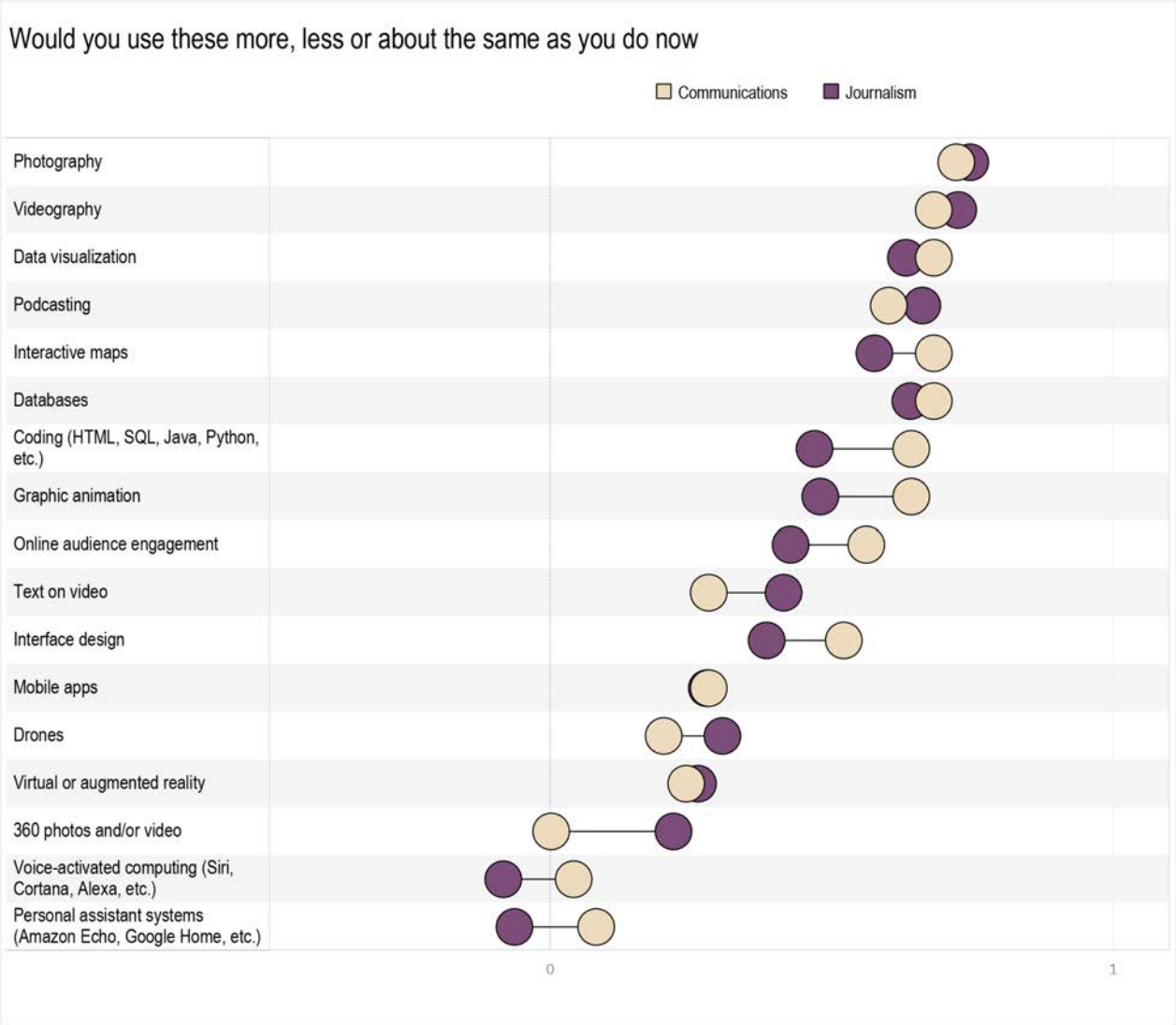
desire to use coding and animation more as compared with their journalism counterparts, while the journalism workers appear to be more bullish on 360 photos/video. But both groups express a desire to work more with photography, videography, data visualization, podcasting, and databases in more or less equal measure. The areas of voice-activated computing and personal assistant systems had a small proportion of 'more' and 'less' respondents so those results should be viewed with some caution. As noted in Fig. 2, the majority of respondents appear to be on the fence about these.

PREVALENCE OF USE

But what graduates may wish to do is at odds with what they are doing in practice. In order to gauge real-world technology use, respondents were asked specific questions about their job-related technology use. Responses were provided on a Likert scale from 1 (never) to 5 (several times per week), as illustrated in Fig. 6.

Respondents reported performing tasks related to social media the most frequently, particularly for research and finding contacts and sources, with nearly 60% indicating doing so at least once per week or several times per week. Indeed, some indicated they wish they had learned more about using social media this way, while in their journalism programs. Said one of what would have better prepared them for the technological demands of their job: "Understanding that you are constantly checked in to social media, and that you are therefore expected to know what is going on at all times. I wish I had learned how to use it more as

Figure 5



a tool." Said another: "I think it would have helped if I'd had more training on how to properly search social media for story ideas/information."

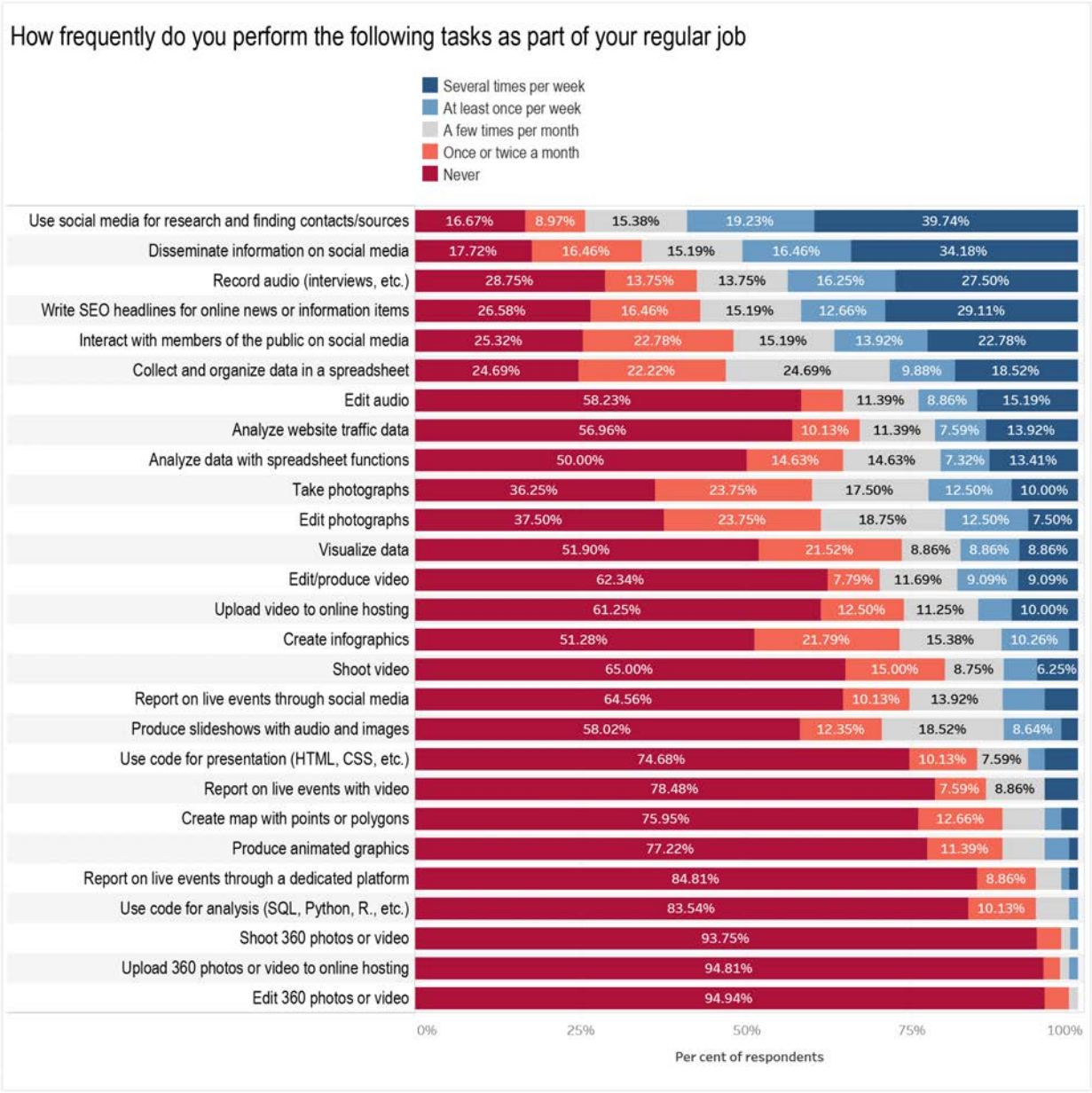
More than half of respondents also indicated recording audio, writing SEO headlines, interacting with the public on social media, and collecting/organizing data in a spreadsheet at least a few times per month. More 'leading edge' tasks, such as visualizing data, writing code (for either presentation or analysis), creating maps from points or polygons, or working with 360 photos/video were much less common, with at least 50% of respondents indicating they never perform these tasks. As illustrated in Fig. 7, those working in non-journalism areas appear much more likely to perform some 'leading-edge' tasks than those working in journalism.

Perhaps not surprisingly, the journalism respondents reported frequent use of audio recording, with 40% saying they did this very frequently (i.e. several times per week) and another 20% reporting they did this frequently (at least once per week). By contrast, just over 53% of the non-journalist respondents said they never did this. The journalism group was also more likely to edit photographs, audio, and video.

Using 360-degree photos or video, a technology that can create an immersive experience for the viewer, has been touted as a new way of storytelling that may help produce more empathy among viewers (Shin & Biocca, 2018). But more than 90% of both the journalist and communications respondents had never shot or edited such content. More than 70% of both groups had likewise never created animated graphics.

Skills falling under the umbrella of data

Figure 6



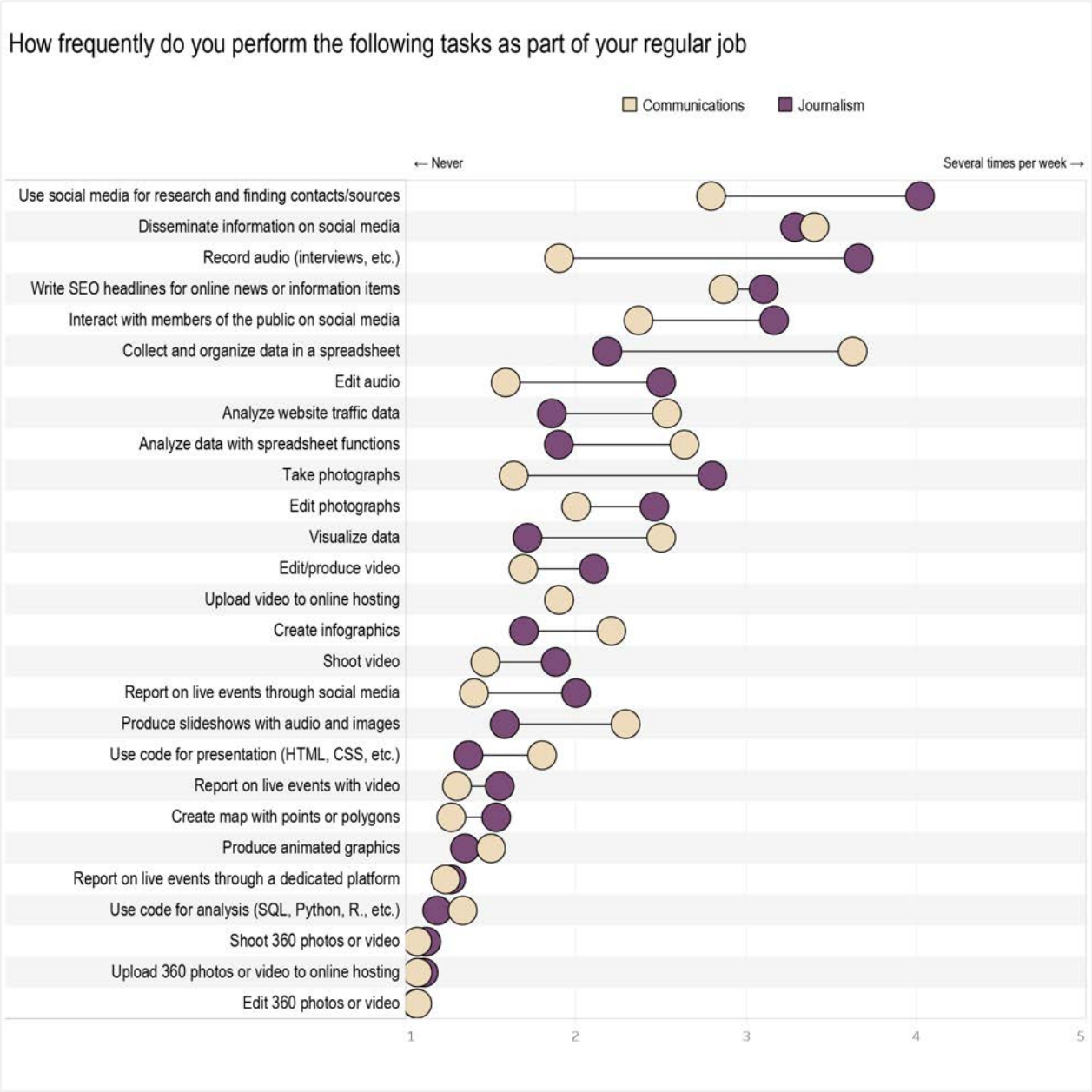
journalism were actually more likely to be used by the graduates working in communications fields than by the journalists. For example, 34% of those not working in journalistic jobs said they collected and organized data in spreadsheets several times a week, compared to only 8% of those in journalistic fields. While just over 6% of communications respondents reported that they never did spreadsheet work, nearly 37% of journalism respondents indicated this. Non-journalists were also more likely to visualize data, though only 30% did this either frequently or very frequently. By comparison, just over 10% of journalism respondents said the same.

Most graduates from both groups never used coding, either to analyze data or for web presentation. In both cases, the journalism group was more likely to report that they never perform these functions.

POSSIBLE BARRIERS

As noted in the earlier analysis, there are many technology areas that appear to be under-utilized, defined as areas that recent journalism graduates see as being useful and indicate that they would use more in their work in an ideal world. The survey data provides some indicators of why this gap exists.

Figure 7



Respondents were asked whether they agree or disagree with a series of statements that explain the perceived gap. Responses were provided on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). As illustrated in Fig. 8, the strongest agreement was found in the claim that the technologies are not provided in the workplace. Other factors included respondents being too busy doing other things and some indication of a lack of confidence.

Respondents were also able to offer alternative explanations in an open-ended field. While most did not offer additional reasons, one journalism respondent said: "Primarily my work in editorial does not cross over with the photography team, or digital team. Very segmented and I think that's stopping us from advancing our publication." Another offered this reason: "I live in quite a small community and our strongest medium is still print. Many of these technologies would require spending a lot of time to learn/keep up with technologies that only a few people actually click on. (Which is a chicken/egg thing.)"

Another respondent cited a culture that preferred the status quo and yet another indicated that many technology areas were too expensive. Many of the perceived barriers appear to be common to both journalism and communications workplaces as illustrated in Fig. 9.

The two reported reasons where there was

Figure 8

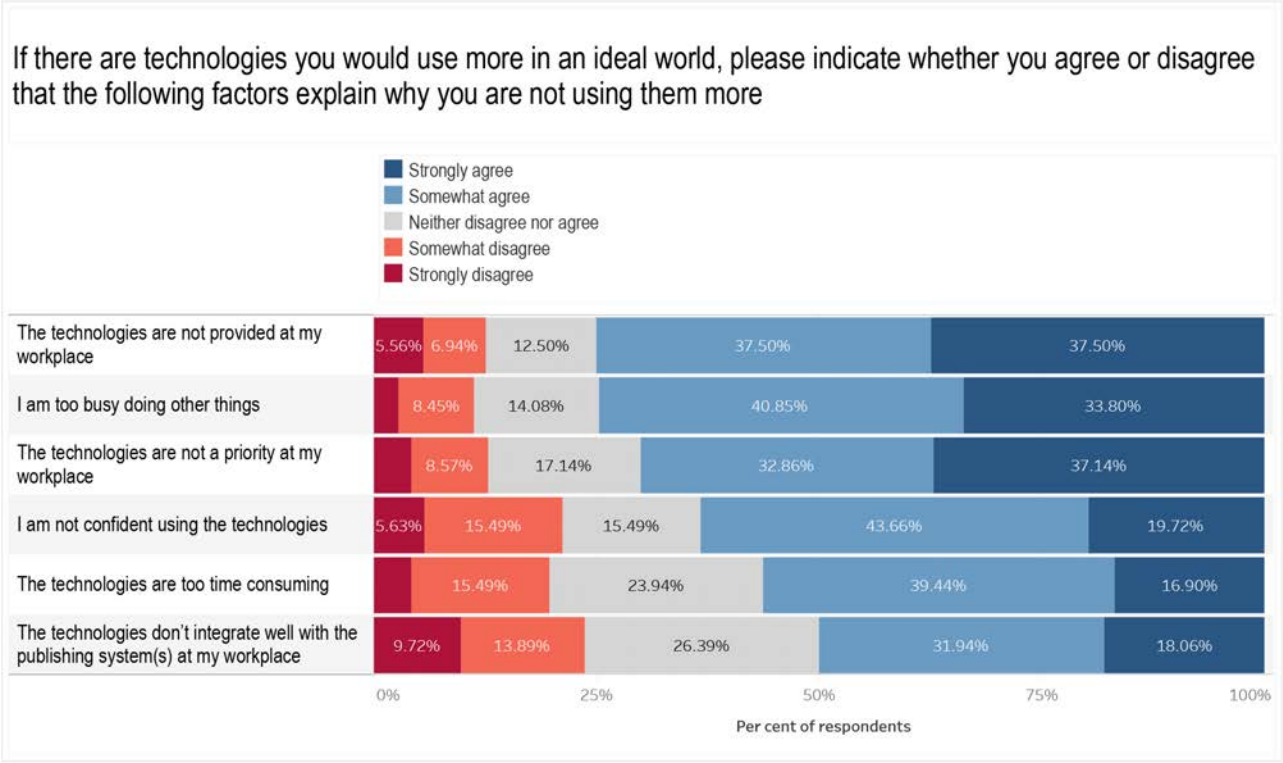
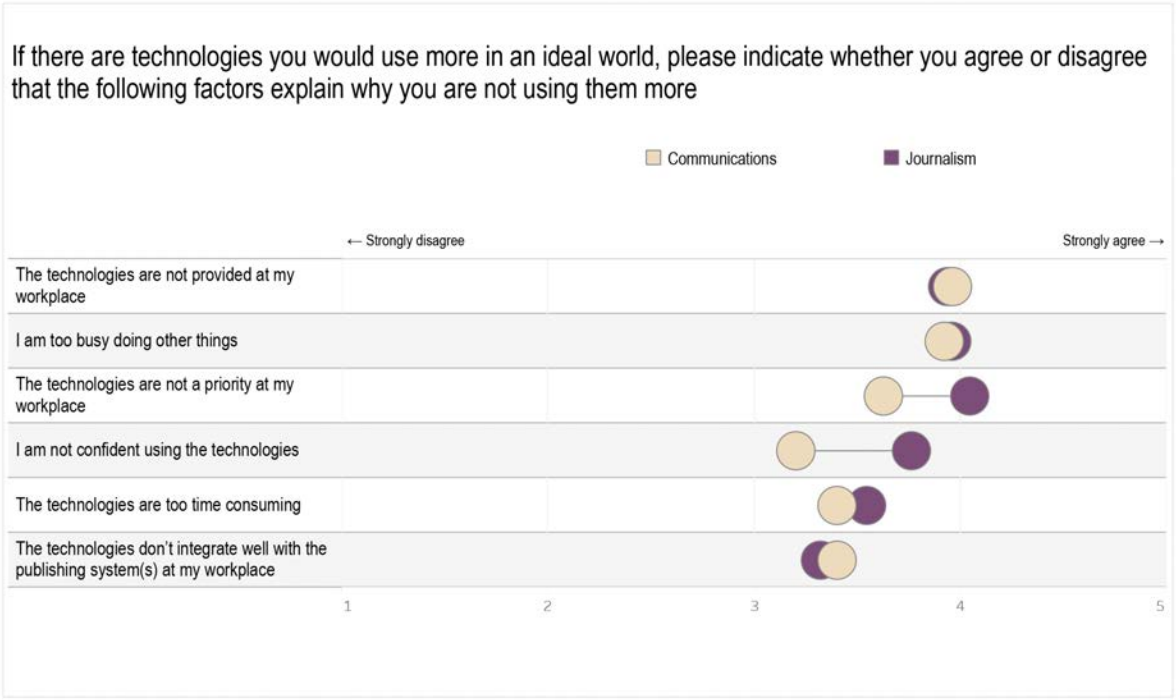


Figure 9



least agreement were the workplace priority, where journalism respondents were somewhat more likely to agree, and the perceived confidence, where journalism respondents were also more likely to agree.

RESULTS

The purpose of this study was to provide some empirical measure of the extent to which recent journalism program graduates are engaged in 'innovative' practice, defined as using technologies deemed 'useful' for journalistic purposes as part of their work. Based on the survey results, we offer the following answers to the research questions.

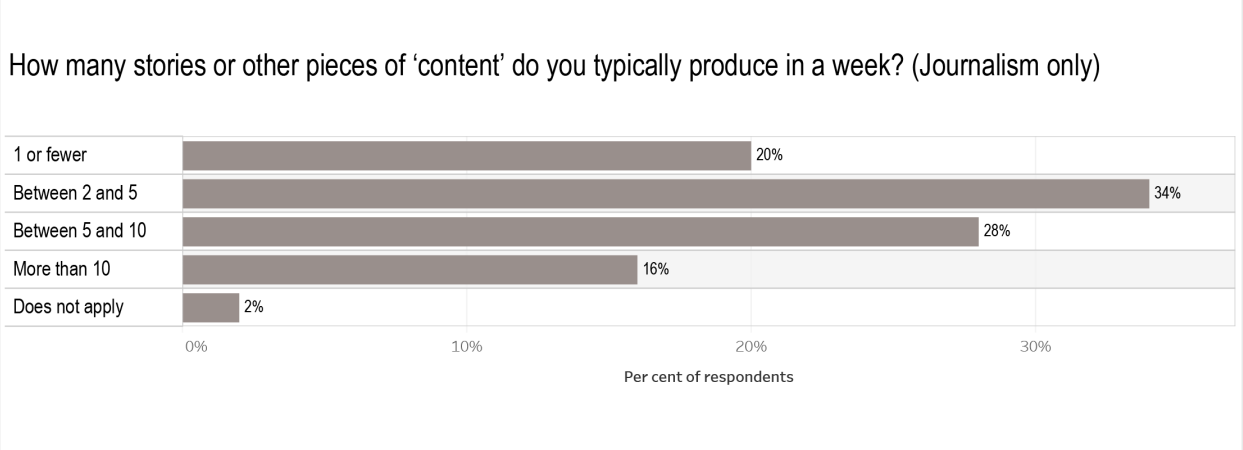
RQ1: Recent journalism graduates deemed a broad variety of different technology-oriented areas and tasks as being useful. The areas most commonly rated as "very useful" were photography, videography, data visualization, podcasting, and databases. Interactive maps, online audience engagement, text on video, graphic animation, and mobile apps were also deemed very useful by at least a majority of respondents. Recent graduates were somewhat more tentative about some of the more advanced areas, including drones, 360-degree photography/video, virtual/augmented reality, or voice-activated computing.

RQ2: Technology areas around social media, notably using social media for research and finding sources, were most commonly used. More than half of respondents also reported recording audio, writing SEO headlines, and collecting and organizing data in a spreadsheet at least a few times per month. A slight majority of respondents indicated they never perform some other tasks, including analyzing data with spreadsheet functions, creating infographics, and visualizing data. In more leading edge areas, including coding, map creation, and 360-degree video and photo, large majorities reported never performing related tasks.

RQ3: Respondents indicated multiple technology areas they say they would use more frequently for their work in an ideal world, including photography, videography, podcasting, data visualization, databases, and interactive maps. Even a majority of respondents indicated that they would use coding more. As with attitudes towards whether technology areas are useful, respondents were less likely to indicate they would use more leading edge areas more, such as virtual/augmented reality, or voice-activated computing.

RQ4: Recent graduates indicated a number of different factors that help explain why they are not using different technology areas more than they say they would in an ideal world. Those working in journalism most commonly agreed with the statement that the technology areas were not a priority in their workplaces, and that they were too busy doing other things. As illustrated in Fig. 10, of those doing journalism work, nearly a

Figure 10



third reported that they produce between five and 10 stories (or pieces of content) each week, and another 16% indicated that they produce more than 10, so the pace of journalism production may be a contributing factor.

Those doing journalism work expressed stronger agreement with the statement that they lacked confidence than those working in communications fields.

DISCUSSION AND IMPLICATIONS

This study provides some insight into what this group of journalism graduates considered "useful" in their nascent practice. It suggests a notable difference between the kind of innovative practice that journalism school graduates might engage in as compared with what they are actually doing. Aspects of the survey data echo earlier research (Larsson & Ihlebæket, 2017; Powers et al., 2018), which found that reporters used social media and other new technologies to perform traditional or routine journalistic tasks, or that the technologies displaced earlier technologies that had been used for the same tasks (Reich, 2013). But the results also show this is not necessarily what the graduates would ideally want to do, and indeed, a minority were using technology in ways that go beyond traditional journalistic approaches.

Respondents to this survey appear to have embraced social media to perform traditional journalistic tasks such as finding human sources and story ideas. While social media platforms were cited by many of the graduates as important for both researching and promoting the news, other practices that require greater technical proficiency and allowed work that was not as immediately recognizable as in the traditional model, were not being widely used by these graduates. It appears the work the recent graduates were doing, in their early career employment, was quite similar, aside from the online technologies they had adopted, to work of previous generations of journalists. This may reinforce Ryfe's conclusion about the inherent conservatism of traditional news organizations (Ryfe, 2012). In 2008, after his analysis of a U.S. metropolitan newspaper, Ryfe wrote that, in the face of changes related to the Internet, the journalists "remained convinced that the way forward was to preserve the newspaper and to protect their investments in traditional practices and values." Ryfe concluded that "[t]hey simply made the wrong calculation" (p. 227). In the current study, in the cases where recent graduates provided additional detail in the open-ended comments, they referenced workflows that prioritize traditional, print-based news production.

Nevertheless, the graduates recognized a wide range of innovative technologies as useful or potentially useful in journalism, and the survey data shows a gulf between innovative methods the graduates see as valuable for the practice of journalism and the actual opportunities to use these methods in the journalistic workplaces where they have found early employment. These included tools that are well established in the practice of some journalists and organizations, such as analyzing and visualizing data (which can be done with Excel or Google Sheets), and others that might be viewed as more leading-edge or esoteric, such as 360 images and video, writing code, or using drones. Indeed, some respondents appear to be using some of these tools already, suggesting that even at this early stage in their careers, opportunities exist to move beyond methods that are analogs of journalism past.

This also suggests some notable limits to what Steensen (2009) refers to as "the power of individual action." Recent journalism graduates will, by definition, be located at a relatively low position in any workplace hierarchy. Nevertheless, they will also bring technological skills learned in their degree programs and elsewhere and possibly new ways of doing things. But as noted above, respondents identified a number of possible 'barriers' to innovative practice, some related to perceived support and/or management limitations in their workplaces and some related to their perceived abilities.

While these findings are not generalizable to all recent journalism graduates, they run counter to the more optimistic narratives found in some of the innovation literature. For example there is no evident demand for a young journalist who can "[m]ake a basic website from scratch using HTML/CSS" (Royal, 2014). While recent graduates in this study see these coding skills as useful and indicate they would use them more in an ideal world, these

skills are rarely, if ever, put to use, at least in the Canadian context represented by these survey respondents.

These results may give some comfort to the traditionalists among journalism educators, who emphasize the importance of traditional news skills in identifying newsworthy topics, gathering information, synthesizing and assembling that information into news stories, and disseminating those stories. It is possible that these tasks will remain central to journalism for the foreseeable future, which would suggest that no matter what technologies may come along, important parts of what it means to report the news will remain essential parts of journalism program curricula. At the same time, those curricula will need to adapt to the newer technologies that can be usefully applied to journalism work in an increasingly networked world and that means constant vigilance in identifying those tools that can best facilitate that work. As Pavlik wrote (2013), "[a] media curriculum that emphasizes innovation and digital media entrepreneurship is one of the keys to a robust professional future for the field and students seeking a media career" (p. 213).

On that score, we acknowledge that our own programs could embrace technological innovation in a more robust way. Journalism educators face a host of challenges on this front, notably, how much of the curriculum in an undergraduate journalism program should be occupied teaching innovative or 'out there' tools that may only be used minimally once graduates actually begin their careers, which may never become more than niche tools or which may be replaced by new proposed technologies in a few years? Given the volume of material a typical journalism program must cover, this is a question that needs to be considered carefully.

At the same time, some journalists *are* employing non-traditional tools such as writing code, analyzing data, and creating immersive web experiences, possibly including at least some of those surveyed here. Some respondents said they would have been better prepared had they had training – or more training – in areas such as coding, data analysis, and web design. Both of the journalism schools from which students graduated have courses in their curricula that at least touch on areas such as data journalism, though whether the amount of emphasis in these programs is optimal is an open question. Journalism educators would seem to have an important, continuing role in identifying these 'up and coming' approaches, and exposing their students to them.

So should journalism schools focus on the "basics" or prepare their students to use technologies not currently seeing widespread adoption? We would argue it is a bit of both. But while the authors are both enthusiastic about many different new and emerging innovation practices, it is tempting to get carried away by some of the literature and commentary about journalism innovation. To some extent, journalism education should be based on empirical realities.

For example, educators need to ensure that they are teaching skills such as social media use in the context of all aspects of news production. This means that the teaching of social media skills needs to go beyond how to distribute content on platforms such as Facebook, Twitter, Instagram, and TikTok, but must address how these kinds of tools can be mined to find and develop sources, identify possible story ideas and perform other basic journalistic functions, all within the context of critical and ethical practice.

That said, journalism schools should not simply serve the "industry." They are often the first place new practitioners are exposed to the norms and practices of journalistic practice and therefore have an important role in defining what is efficient and useful. In our view, journalism curricula need to incorporate innovative skills into the core of journalism curricula rather than treat them as optional extras for an interested few. Important areas of innovation such as data journalism ought not to be explored only in electives or graduate programs; they need to be made part of core undergraduate journalism curricula, ideally in such a way that they are integrated into the courses that are considered foundational. Teaching the basics of interviewing, writing, and packaging text, audio, and video stories is still critically important, and is likely to remain so, but so is learning how to use a spreadsheet to better understand a City Hall budget, and creating visualizations to tell number-heavy stories in ways that will appeal to an audience; otherwise schools of journalism will simply reinforce the idea that the "basics"of journalism are somehow unchanging, and that new tools should mainly be employed to perform

traditional tasks.

Indeed, it can be argued that schools need to play a role in 'seeding' the news industry with graduates who are able to do innovative work, even if they are not immediately able to use the skills in their first reporting jobs. The results of this survey suggest that while this group of young journalists is not always engaging in 'innovative' practice, they see the value or potential value of them and would use them more if they could. The comparison between those in journalism and those in communications work provides some evidence that young journalists appear eager and capable of more innovative technological practice than they now appear to be engaged in. At the very least, there appears to be a strong consensus among the recent graduates that data-oriented skills are highly useful and would be used more. More emphasis in this area would likely be of benefit to program graduates and newsrooms.

This analysis is not intended to be overly critical of current priorities in Canadian newsrooms. As noted, many are struggling to stay afloat as revenue sources dry up. At the same time, these young journalists appear to be busy producing a fairly large number of stories each week, which evidently leaves little time to adopt other practices typically associated with innovation in journalism. (And this isn't to say that there aren't experienced journalists and others doing this kind of work, likely in the very newsrooms represented in this study.) Digital startups elsewhere have helped popularize different forms of journalism, from data-oriented analysis (fivethirtyeight.com) to explainer-style work (vox.com). But many areas of digital innovation have seemingly made limited inroads into the working lives of the recent graduates surveyed.

CONCLUSION AND FURTHER RESEARCH

This study paints at least a partial picture of the state of technological innovation among recent journalism graduates who have found employment in their fields. According to this picture, young journalists and communications workers are mostly not writing code or developing applications or generally harnessing more 'leading-edge' technology in innovative ways. However, their assessment of what is useful for journalism work and what they would do more of may provide important guidance for enhancing journalism curricula while at the same time being realistic about contemporary journalism work.

This study has limitations. First, it represents only 99 respondents. A larger study that could claim to be representative would allow us to draw more definite conclusions. Adding interviews would also allow researchers to explore the state of innovation more deeply. This study also offers just a snapshot in time. A recurring study might be useful for establishing which practices are gaining more traction and which fall out of favour. If journalism workers can expect anything from the future, 'change' would surely be at the top of the list.

Appendix A - Survey Questions

Please indicate the frequency with which you perform the following tasks as part of your regular job:

	Never	Rarely (i.e. once or twice a month)	Occasionally (a few times a month)	Frequently (at least once per week)	Very Frequently (several times a week)
Take photographs	○	○	○	○	○
Edit photographs	○	○	○	○	○
Record audio (interviews, etc.)	○	○	○	○	○
Edit audio	○	○	○	○	○
Produce slideshows with audio and images	○	○	○	○	○
Shoot video	○	○	○	○	○
Edit/produce video	○	○	○	○	○
Upload video to online hosting (YouTube, Vimeo, Facebook, etc.)	○	○	○	○	○
Shoot 360 photos or video	○	○	○	○	○
Edit 360 photos or video	○	○	○	○	○
Upload 360 photos or video to online hosting	○	○	○	○	○
Create map with points or polygons	○	○	○	○	○
Create infographics	○	○	○	○	○
Collect and organize data in a spreadsheet	○	○	○	○	○
Analyze data with spreadsheet functions (sum, average, standard deviation, etc.)	○	○	○	○	○
Visualize data (Excel, Google Charts, Tableau, datawrapper, etc.)	○	○	○	○	○
Produce animated graphics	○	○	○	○	○

	Never	Rarely (i.e. once or twice a month)	Occasionally (a few times a month)	Frequently (at least once per week)	Very Frequently (several times a week)
Write search engine optimized headlines for online news or information items (news stories, press releases, etc.)	○	○	○	○	○
Disseminate information on social media	○	○	○	○	○
Use social media for research and finding contacts/sources	○	○	○	○	○
Interact with members of the public on social media	○	○	○	○	○
Use code for analysis (SQL, Python, R., etc.)	○	○	○	○	○
Use code for presentation (HTML, CSS, etc.)	○	○	○	○	○
Analyze website traffic data	○	○	○	○	○
Report on live events with video (through YouTube, Facebook live, etc.)	○	○	○	○	○
Report on live events through social media (Twitter, Facebook, etc.)	○	○	○	○	○
Report on live events through a dedicated platform (Slack, for example)	○	○	○	○	○

How many stories or other pieces of 'content' do you typically produce in a week?

1 or fewer	Between 2 and 5	Between 5 and 10	More than 10	Does not apply
○	○	○	○	○

Please indicate the extent to which you feel the following technologies or technology-related tasks are useful, or potentially useful, for the practice of journalism:

	Not sure	Not at all useful	Somewhat useful	Very useful
360 photos and/or video	○	○	○	○
Data visualization	○	○	○	○
Personal assistant systems (Amazon Echo, Google Home, etc.)	○	○	○	○
Drones	○	○	○	○
Databases	○	○	○	○
Virtual or augmented reality	○	○	○	○
Interactive maps	○	○	○	○
Graphic animation	○	○	○	○
Voice-activated computing (Siri, Cortana, Alexa, etc.)	○	○	○	○
Mobile apps	○	○	○	○
Videography	○	○	○	○
Podcasting	○	○	○	○
Coding (HTML, SQL, Java, Python, etc.)	○	○	○	○
Photography	○	○	○	○
Online audience engagement	○	○	○	○
Interface design	○	○	○	○
Text on video	○	○	○	○

Of those same technologies, please indicate whether, in an ideal world, you would use them more, less or about the same as you do now.

	Not sure	Would use less	Would use about the same	Would use more
360 photos and/or video	○	○	○	○
Data visualization	○	○	○	○
Personal assistant systems (Amazon Echo, Google Home, etc.)	○	○	○	○
Drones	○	○	○	○
Databases	○	○	○	○
Virtual or augmented reality	○	○	○	○
Interactive maps	○	○	○	○
Graphic animation	○	○	○	○
Voice-activated computing (Siri, Cortana, Alexa, etc.)	○	○	○	○
Mobile apps	○	○	○	○
Videography	○	○	○	○
Podcasting	○	○	○	○
Coding (HTML, SQL, Java, Python, etc.)	○	○	○	○
Photography	○	○	○	○
Online audience engagement	○	○	○	○
Interface design	○	○	○	○
Text on video	○	○	○	○

Is there a technology or technology-related task you feel is important but is missing from this list? (Leave blank if not)

If there are technologies you would use more in an ideal world, please indicate whether you agree or disagree that the following factors explain why you are not using them more.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
The technologies are not provided at my workplace	○	○	○	○	○
I am not confident using the technologies	○	○	○	○	○
The technologies are not a priority at my workplace	○	○	○	○	○
I am too busy doing other things	○	○	○	○	○
The technologies are too time consuming	○	○	○	○	○
The technologies don't integrate well with the publishing system(s) at my workplace	○	○	○	○	○

If there are other reasons, please describe them. (Leave blank if not)

Please indicate how important you think it is for journalists to do the following:

	Unimportant	Of Little Importance	Moderately Important	Very Important	Extremely Important
Be a detached observer	○	○	○	○	○
Promote social change	○	○	○	○	○
Remain strictly impartial	○	○	○	○	○
Influence public opinion	○	○	○	○	○
Be a neutral disseminator of information	○	○	○	○	○
Set the socio-political agenda	○	○	○	○	○
Mirror reality as it is	○	○	○	○	○
Report about positive developments in society	○	○	○	○	○
Not let personal beliefs and convictions influence reporting	○	○	○	○	○
Be transparent about the working process	○	○	○	○	○
Let facts speak for themselves	○	○	○	○	○
Monitor and scrutinize the reporting of other news media	○	○	○	○	○

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