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Abstract

Students and postdoctoral researchers interested in tenure-track environmental engineering positions have limited resources to aid them. The student services committee (SSC) of the Association of Environmental Engineering and Science Professors (AEESP) organized a workshop to fill some of the need. Newly hired faculty and experienced Search Committee and Department Chairs shared information on how to create competitive applications. Students and postdocs were also provided with individualized feedback on their faculty application packages. Survey data were collected for all participants and those data are presented here along with tips shared during the workshop and information collected from the literature. The objective of this paper is to share that information in order to i) inform applicants (students and postdocs) about the academic job search process, and to ii) inform mentors about how to mentor applicants. Survey responses revealed that participants felt they learned valuable information about the job search process. They found the personalized feedback on application packages to be the most helpful activity; other mentors are encouraged to provide similar personalized feedback. A wiki website component included in the workshop was effective at engaging the participants and helped broaden the impact beyond the workshop attendees. Key lessons learned by comparing workshop results with literature were the importance of “fit,” the unique diversity of environmental engineering, mentoring and networking, PhD planning sessions, being informed, and becoming a more skilled candidate. These recommendations presented here can be used by students and postdocs and by their mentors to facilitate the candidate’s path toward academia.

Keywords: Job, application, faculty, academic, workshop, interview, mentor, teaching, research

Introduction

For individuals interested in entering the environmental engineering academe, a major challenge is the limited availability of faculty positions. In 2010, 134 individuals graduated with doctoral degrees classified as environmental engineering in the USA, with another 1,765 classified as civil, civil/environmental, biological and agricultural, and chemical engineering (Gibbons 2010). A portion of these graduates express interest in continuing their career in academia through tenure-track university faculty positions focused on teaching and research. Moreover, a number of practicing scientists and engineers in industrial and government positions also consider faculty positions and they add to the applicant pools. In comparison, between 2009 and 2011 about 80 environmental engineering professorship positions were advertised through academic and non-profit industry trade association notices. The number of tenured/tenure-track faculty listed in the environmental engineering discipline in 2010 was 182 with 556 faculty listed as civil/environmental (civil is listed separately and had 2,616 faculty) (Gibbons 2010). These data show that the number of positions available falls quite short of the number of potential applicants and therefore makes the environmental engineering academic job application process highly competitive.

A notable trend in academia as a whole is that full-time tenured appointments are becoming less available while short-term, non-tenure-track lecturer and other positions are becoming more common. Between 1999 and 2009 four-year educational institutions (public and private) increased the number of non-tenure-track full-time faculty members by 56%, while the number of full-time tenure-track faculty increased by 20% and the number of tenured faculty increased by only 7% ("Colleges' Reliance on Part-Time and Nontenured Faculty Has Grown", 2011). The exact numbers may vary for environmental engineering, but the trend is expected to be similar. The changing landscape for academia in environmental engineering is also represented by an increased number of postdoctoral appointments for recent graduates before beginning tenure-track careers, as opposed to previously when many professors began directly after graduate school.

As the number of available tenure-track positions continue to decline, obtaining one becomes increasingly competitive. Despite this increased competition, resources and mentoring avenues to aid with the job application process remain scarce. Applicants often receive little mentoring regarding the job application process and the advice they do receive typically comes only from their primary advisor. In addition, minimal literature resources are available that provide guidance for academic job applicants, and relatively few are tailored specifically to the environmental engineering discipline. The mentors (e.g. academic advisors, colleagues, and/or mentoring groups like university departments, PhD completion programs, and professional organizations) have few outside resources to help prepare students and postdocs for the academic world.

In response to these issues, the goals of this manuscript are to i) inform applicants (students and postdocs) about the environmental engineering academic job search process, and to ii) inform mentors about how to mentor applicants. To accomplish these objectives we report on the development of an academic job search workshop format that may be helpful specifically for mentors interested in organizing similar workshops for students. We document the outcome of an academic job search workshop that was organized by the Students Services Committee (SSC) of

Association of Environmental Engineering and Science Professors (AEESP). In addition, we complement the workshop outcome discussion with literature findings to provide a broader perspective for both applicants and mentors.

Motivation from a Prior Academic Job Workshop

In 2009, the SSC held its first academic job workshop in Iowa City, Iowa for Ph.D. students and postdoctoral associates. At the time of writing the present manuscript, 38% of the workshop attendees were employed as faculty members at American and European universities (**Table 1**) and 43% held postdoctoral associate positions, primarily at academic institutions. The remaining attendees were employed through various other roles (10%) at academic institutions and within the private sector (10%).

The success of the first workshop led to a desire to document the workshop methods and results for others to use. A second workshop was held in 2011 and data were collected; information and tips shared during the workshop were recorded and participants were surveyed to gauge their response. Usage statistics for the on-line portion of the workshop were also analyzed. Methods and data for the second workshop are presented in this paper.

Workshop Organization

Pre-workshop activities

The 2011 workshop was held in Tampa, Florida, during the biannual AEESP education and research conference. The workshop goal was to provide individuals seeking faculty appointments an opportunity to learn about the academic job search process and receive individualized feedback on their faculty position application documents. Expert reviewers consisted of junior and senior level professors. The workshop's target audience was graduate students and postdocs who desired tenure-track environmental engineering faculty positions. Approximately 10 volunteers dedicated a total of 100 hours into workshop organization. Several other faculty volunteers (described below) dedicated time to reviewing application materials and providing feedback.

The event was advertised through the AEESP email listserve, the AEESP newsletter, web-posted AEESP conference announcement, and by organizer direct communications. Enrollment was capped at 30 and seats were filled on a first come, first serve basis. Attendee participation required a three-step process that ensured the workshop participation of only students ready to apply or already applying to faculty positions. The workshop efficiency and effectiveness were increased by focusing on this target group. Each student/postdoc wishing to participate was asked to submit an e-mail request with a 150-250 word statement describing their reasons for wanting to attend. Second, each participant was invited to join a wiki website developed by the SSC. The wiki format was chosen because it allowed multiple users to upload and edit online content and enabled workshop developers to design the workshop presentations around specific attendee questions. Each participant was required to complete an assignment with the wiki site. The assignment was due at least 10 days prior to the workshop and participants added their ideas about:

1. Faculty qualities
2. Tips on teaching
3. Tips on supervising
4. Being a student
5. Tips on getting funding
6. Workshop attendee questions
7. Careers
8. Professional organizations
9. Scholarships and fellowships

In addition to wiki comments, participants submitted their confidential application package to the organizing committee. The package included materials typically required in a faculty job application (e.g., cover letter, research statement, teaching statement, curriculum vitae) as well as a list of startup equipment and major supplies and three presentation slides that described their future research plan. Faculty volunteers were recruited by an email announcement to the AEESP listserv and through organizer direct communications. Workshop organizers then matched the participant application package with faculty volunteers. Faculty volunteers were directed to prepare feedback for their assigned applications. This feedback would be discussed in the workshop's small-group session.

Workshop Activities

The workshop format consisted of platform presentations, a panel discussion, and a small-group feedback session (**Table 2**). This approach provided both general job search advice to the group and specific feedback to each individual. Three newly hired faculty members provided their perspectives and experiences on the job search process. Discussion during this period included personal perspectives on the search process, opportunities available, and on-the-job new faculty experiences. Panel discussion was led by faculty who served as department chairs and search committee chairs. These individuals provided their perspectives on the job search process, including common pitfalls of unsuccessful applicants and interviews. During the small group session, groups included two faculty members and two to three students or postdocs. Faculty provided targeted feedback on the individuals' application packages, which they had read before the meeting. During this time students also provided feedback and suggestions on other student and postdoc application packages in the group.

Workshop Evaluation and Assessment

Exit surveys were collected for 42 workshop attendees: 23 graduate students, 9 postdoctoral associates, and 10 faculty. (The student/postdoc number exceeded the original cap of 30 for reasons described below). Student and postdoc participants answered one set of survey questions, while faculty answered a different set.

Results and Assessment

Results of Pre-workshop Activities

Workshop advertising and pre-workshop participation were effective as demonstrated by the submission of more than thirty statements from applicants who wished to attend, wiki usage statistics, and 28 additional persons who requested attendance after the application deadline. An

increase in wiki page views showed that the announcements were effective in reaching out to potential participants with an increase in page views (up to 216 per day) and unique visitors (up to 47 per day) shortly after release of the announcements. The use of the wiki by students was successful as evidenced by all participants contributing to it. Wiki activity was quite high because of the wiki assignment; there were 350 page views the day before the assignment deadline. In addition, while the page views were fairly consistent throughout the year (about 15 per day), the unique visitors increased from 10 per day before the workshop announcement to 25 per day after the workshop. This increase suggests that the new content added by workshop participants resulted in more people using the wiki as a resource on academic jobs.

Twenty-eight additional interested individuals learned about the workshop through the AEESP conference registration process and submitted their statements to the organizing committee after the deadline. The additional participants attended the workshop, but their applications were not reviewed during the face-to-face breakout session. Application packages for those late submission participants were separately reviewed through email by additional faculty volunteers.

Workshop Assessment

Overall Quality

Participants were asked to rate the overall quality of the workshop on a 10-point scale. The average ratings were 9.1, 9.0, and 9.1 for students, postdocs, and faculty, respectively (**Table 3**).

Graduate Student and Postdoctoral Associate Perspectives

Numerically assessable survey data for graduate students and postdocs are given in **Table 4**. The vast majority (82%) of student participants had not applied for any faculty positions before the workshop, while more than two-thirds of the postdocs had applied for at least one position. Postdocs generally had applied to 20 positions each while the handful of students that had applied previously typically only reported 1-2 applications, with one student submitting ten.

The participants' previous success with preparing a competitive applicant package was gauged on their response to a question asking the number of telephone and onsite interviews they had completed. Postdocs (who had generally applied to multiple faculty positions) completed one interview for every eight applications submitted. Students submitting one or two applications had one or no interviews, while the student who submitted ten applications reported five interviews.

Most students (87%) and postdocs (70%) expected to complete a postdoc or nonacademic employment before obtaining a faculty position. Nearly half of all participants reported that their "dream" faculty position was 50% research and 50% teaching focused; the remainder of the responses were split fairly evenly between research focused and teaching focused preferences.

Most students and all of the postdocs reported that the wiki website was helpful in preparing for the workshop. Students who reported the wiki website was not useful all expressed elsewhere in their open-ended comments (described further below) that the review of individual application packages was important. This suggests that these students were not averse to pre-workshop preparation, but rather that they found the individual package preparation more important than the assigned wiki work.

For the first open-ended question, participants were asked what they liked most about the workshop. Almost unanimously students mentioned that direct feedback on their faculty application from two separate faculty and other participants was very helpful. Perspectives by the invited panel members and discussions during breakout sessions were also frequently cited. Mentioned, but not as frequently, were the perspectives of new (junior) faculty during the introduction and panel. There was a clear demand for more time dedicated to panel and small group discussions and one person proposed that the workshop be expanded to a full day. (Note that this was not an option for this event since all pre-conference workshops were limited to a half day so conference attendees could participate in more than one). Postdocs provided comments similar to the students, but had distinctly more specific requests for assigning participants to faculty of similar institutions (e.g. teaching-focused participants to faculty from teaching-focused institutions). Postdocs also requested more information about onsite interviews and the details of the academic job search process. One postdoc suggested that currently available funding sources be discussed.

When specifically asked to identify other resources to be offered by the organization, students and postdocs had somewhat different responses. Students requested more time on package review, further guidance and templates for writing application packages, a list of typical interview questions, and a year-round application review service offered by the organization. Several students cited a need for a website with an updated list of faculty and postdoc job solicitations. (The AEESP.org and other websites identified during the workshop provide this service.) Postdocs requested a website that aggregated job search advice articles, opportunities to follow-up with workshop organizers through the wiki, and a single list that identified all vacant faculty positions. A mentoring program was also suggested, where prospective faculty and current faculty would be paired for more in-depth interaction.

Faculty Perspectives

Faculty attending the workshop as guests and volunteers were asked to describe the most common deficiencies in application packages and shortcomings during telephone and onsite visits. The common denominator of many responses was that deficient applications contained typos, poor presentation, incorrect grammar, disorganization, and were not reader friendly. Other comments included a lack of detail in research plans, an unfocused research plan, and an insufficient number of publications to be competitive for “R1” university positions. The most frequently observed mistakes during interviews included not being familiar with the research and background of interviewers, not being interested in an interviewer’s work, not being familiar with the curriculum of the department, veering off topic, not answering questions succinctly, and not identifying possible collaboration potential with specific faculty.

Along with the common mistakes described above, faculty were asked to state what they believed were the *worst* mistakes to avoid in an application package. Responses were similar to the above, but more specific. While making a typo (mentioned above) is a common mistake, making a typo about the name of the institution or a person was mentioned as the worst mistake. Not presenting a clear research vision was cited as the worst mistake, similar to the common mistakes dealing with unfocused and superficial research plan as mentioned above. Other “worst mistakes” were being unfamiliar with the job description as posted and being too general instead

of discussing the applicant's actual qualifications. Dishonesty was also mentioned here, which was discussed in some detail during the panel sessions; it was clear that the faculty felt any type of dishonesty was unacceptable and would result in quick removal of the applicant from the candidate pool.

When asked what was most useful and what should be changed, the faculty generally appreciated all aspects of the workshop and specifically mentioned the combination of activities (talks by young faculty, panel, and small group breakouts). They appreciated sharing experiences with students and face-to-face interactions in panels. Faculty suggested—similar to the students and postdocs—that more time be dedicated to the small group, individual application feedback.

Observations by Organizing Committee

In reviewing survey responses, the organizing committee recognized that it would have been beneficial to separate the question “what did you like best” from “what would you change.” Responders tended to focus on only one of the questions instead of answering both. Also, the wording of the question, “The worst mistake to avoid in a faculty application package is:” should have been changed to, “The worst mistake to avoid during the job-search process is:”. This would have helped broaden the responders' thinking to include whatever they felt was most detrimental for the entire process, not just the writing of the application package. An additional question that the committee felt should have been included in the survey was, “Give one or two ways in which this workshop will change the way you approach the job-search process.” This would help the organizers to gauge the impact of the workshop in terms of real actions the participants expect to complete because of the lessons learned. The workshop organizers also noted that a follow-up survey delivered to the participants several months or a year after the workshop would be useful to help determine whether the workshop actually helped the applicants find positions.

Current Perspectives on Professional Preparation

Panel discussions at the workshop pointed to certain specific advice that agreed well with and expanded upon what has been published in the literature. As no other concise document is available on this topic, here we provide a summary of these points to guide persons seeking environmental engineering faculty positions. Those seeking to mentor applicants may also find the information useful.

“Fit” in Research and Teaching

In other fields there is a strong precedent that the most important criterion for a candidate is their “fit.” This was emphasized, for example, in a survey of political science department and search committee chairs (Fuerstman 2005). That report also revealed “letters,” “publications,” and “teaching” as the next three most important criteria. A similar survey for hiring in the environmental engineering field is not currently available, but the panel portion of the AEESP workshop showed that both department chairs and search committee members also looked primarily for a person's “fit” when evaluating applications and conducting onsite interviews.

In academe, faculty members are responsible for teaching, research, and/or service actions. The most important responsibility for a specific faculty position advertisement will depend on that institution's mission as well as search committee members and other persons who have a say in

the hiring process (e.g., human resources, department Chair/Head, Dean, Vice-President). This information may or may not be clear in the advertisement, so it is necessary that candidates do their homework and learn about the institution and related positions before applying.

A common belief is that during faculty application screening and onsite interviews, search committees typically focus on research productivity as a screening mechanism to differentiate strong candidates from the many applicants. However, many institutions value teaching over research. In fact, based on a survey of arts and sciences faculty in community colleges it has been suggested that research-intensive universities may be the outliers in demanding that their faculty demonstrate strong research credentials (Twombly 2005). Another cross-institutional study of search committee members pertaining to faculty hiring in the sciences found that statements of teaching philosophy were more commonly requested compared to statements of research (Meizlish 2008). This cross-institutional study also reported that candidates should gain teaching experience to include on their CVs, as well as practice their teaching skills. Even when no classroom teaching experience is included in an interview visit, candidates should understand that their teaching ability is often judged during their research presentation and other interactions (Meizlish 2008). Because there has been no formal survey of environmental engineering departments pertaining to faculty hiring, data are limited, but similar themes as found in the literature were brought out during the workshop. The panel discussion did point out that for research-intensive universities, the publication list is the first cut-off for short-listing applicants, but even at those universities there is demand for good teachers and the candidate's abilities will be scrutinized. Further, it was noted that opportunities with lighter research demands are available for those who are passionate about teaching, but less passionate about research. The highest paid positions are likely in research-intensive settings, but the candidate must decide what type of institution fits their needs and skills.

Diversity

Regarding diversity in faculty hiring, it has been stated that intentional hiring strategies are needed to recruit faculty from underrepresented groups. However, the most pressing deficiency is one of the PhD "pipeline": there simply need to be greater numbers of underrepresented groups successfully completing PhD studies (Smith 2004). Environmental engineering is leading the engineering community in supplying the pipeline with women; 44.8% of doctoral degrees awarded in 2010 were to women, while in engineering as a whole only 22.9% of PhDs were to women (Gibbons 2010). Civil/environmental had 30.4%. Representation by women in the environmental engineering faculty is also stronger than any other engineering discipline; 20.9% of faculty were women in environmental engineering in 2010, while there were only 12.7% women in the whole of engineering. Civil/environmental stood at 15.8%. Data on minority representation in environmental engineering were not available. The panel discussion at the workshop did not provide any additional insight on this topic, but it is interesting to note that about 39% of the student and postdoc workshop attendees were female; this is a similar percentage as the number of PhD graduates cited above.

Getting Prepared

It has been argued that in the changing climate of academia the "socialization process" that occurs in graduate school must change so that new faculty members can work effectively (Austin 2002). For a person's application to be competitive, the person's skill set must reflect the desired

qualifications for the position and must be recognized by the search committee members. In surveys of doctoral students in chemistry and history departments, it was concluded that students often did not receive sufficient instruction on preparing themselves for moving from one phase to another within their doctoral program to help them become independent researchers (Gardner 2008). This concern over a lack of preparation was raised during the workshop by a few faculty volunteers. Some ideas on how to prepare were given during the workshop and are provided below, with citations from the literature where these ideas have been previously promulgated.

Mentoring

It has been suggested that a good mentor is needed for students pursuing an academic career, and that their research advisor usually plays this role. The mentor should help the students understand that their professional and academic activities are parts of a single or branching continuum making up their overall career (National Academy of Engineering 1997). However, it is also recognized that the student will not be a clone of their mentor and the mentor can only offer their one perspective. Students should be encouraged to seek advice and perspectives from others. The workshop was intended to provide valuable instruction from sources outside the students' current advisors and institutions. The wiki website was also intended as a means of gaining insight from many different people to broaden one's horizons; it remains available for others to use. Mentors can point their students to such activities and information. The mentor also plays an important role in helping the mentee build their network. Conscientious advisors will help their students and postdocs build networks long before their applications are submitted. In the relatively small field of environmental engineering, it is quite possible that students and postdocs can interact personally with the people who will one day serve on the search committees that review their application packages.

PhD Planning Sessions

One-on-one interactions or "planning sessions" are useful for PhD students on a yearly basis to help them make plans about their future careers and decide if academe is appropriate for them (Austin 2002). This is mentioned here separately from mentoring because we suggest that the PhD planning sessions should take on a more formal, scheduled form. The workshop itself can be seen as a PhD planning session, where students and postdocs took time out from other activities to focus on their career development. Similar workshops can be (and often are) held in individual departments or institutions, but we suggest that in order to be an effective PhD planning session, the event should focus specifically on the individual and their situation, with the student or postdoc receiving one-on-one attention.

Being Informed Before and After Hire

Advice about successfully beginning an academic career (after being hired) in civil engineering has been published, and is similar to what was discussed in the workshop: one must achieve success with teaching, research, and service (Kelly 1997). More specifically, it was suggested that even though the new faculty member may already have a general idea of what is expected, they should not rely on this general information but should ask questions and clarify what the expectations are. The new faculty member should develop a strategy and discuss it with others who can serve as mentors. Further, they should ensure that their department chair understands the strategy and is supportive of it, using the annual review process to set goals and demonstrate progress. Many of the same kinds of techniques would be useful for PhD students to undergo in

their preparation for acquiring a faculty position, but the institutional support is often lacking. This workshop and the advice for job seekers can aid PhD students, postdocs, and their advisors in setting up a system that will aid in the job seeker's progress, but we stress here that it is ultimately the responsibility of the student or postdoc to keep themselves informed. They should use the mentoring, workshop, and PhD planning opportunities stated above, but should recognize that the academic job search is an inherently entrepreneurial process and one must be self-motivated to learn how to navigate it.

Being a More Skilled Candidate

While this paper focuses on learning about the job search process, it should be stressed that those who have the greatest skills and record as researcher and teacher will be those most likely to obtain a tenure-track position. Research and writing skills should be honed during one's doctoral program. A study has shown that completing a postdoctoral research position before entering a tenure-track position improves the researcher's scholarly output, though has little-to-no effect on teaching effectiveness (Horta 2009). For teaching, a three-step training process is suggested: (1) development of effective oral presentation, (2) formal training, and (3) practice and experiment (Ciaccia 2011). A workshop was held with new and seasoned faculty members in engineering to guide them in advancing their careers (Higgs 2006). Some key pieces of advice offered there were to work daily on papers, communicate clearly about expectations, seek faculty as mentors, focus on important activities, document everything, meet people outside your department, perform to high standards leaving no room for doubt about your quality, and maintain a solid work/life balance. While these items were listed as advice for those who already have a tenure-track position, a student or postdoc would do well to incorporate the advice into their careers now in order to qualify themselves for positions later.

Conclusions

A workshop conducted in 2011 by the AEESP Student Services Committee was effective at educating environmental engineering students and postdocs about the academic job search process. The workshop was well-received by participants; exit survey results of students, postdocs, and faculty volunteers were positive and demonstrate that the workshop helped fulfill a clear need for education on this topic. A series of recommendations were provided by volunteer workshop faculty that can be applied by job seekers, including mentoring, PhD planning sessions, being informed before and after the hire, and being a more skilled candidate. This accomplishes the dual objective of this paper, to i) inform applicants about the academic job search process, and to ii) inform mentors about how to mentor applicants. Mentoring groups like university departments or professional organizations can use a similar strategy as was used here to plan academic job search workshops or other training events. Information was shared and archived on the SSC's wiki website, which was a valuable tool for increasing participation and making the information available to others outside of the workshop. The wiki continues to be maintained as a tool for environmental engineering academic job seekers; the URL is <http://environmentalengineeringscience.wikispaces.com/>. However, in this time of rapid communication and vast quantities of information available via the Internet, the students here recognized the importance of old-fashioned, one-on-one communication. Face-to-face and one-on-one help in preparing and editing application packages was identified as an important need.

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Tables

Table 1. 2012 Employment status of inaugural academic job workshop attendees

Job Title	Number of Participants	Percent of Total
Professor	9	41%
Postdoc	9 (5 Ac.; 3 Gov.; 1 Prvt. Sector)	41%
Private Sector	3	14%
University Administrator/Outreach	1	4%

Table 2. Workshop format

Duration	Activity	Description
5 minutes	Welcome by organizing committee	-
20 minutes	Presentations by recently hired faculty	Perspectives from new and second time job search applicants
55 minutes	Panel discussion by department and search committee chairs	Perspectives from teaching and research universities
75 minutes	Small group review of applications	Teams of students and faculty discussed students' mock application materials
5 minutes	Participant survey and wrap up	-

Table 3. Participants' rating of the overall workshop quality assigned on a ten point scale.

	Students	Postdocs	Faculty
On a scale of 1 to 10, the quality of the workshop is...	1	1	
	6	2	1
	6	3	5
	10	4	2

Table 4. Exit survey data for numerically assessable questions.

		Students	Postdocs
I applied for faculty positions before attending this workshop.	Yes	4 	7 
	No	18 	3 
How many positions have you applied for?		1, 1, 2, 10	7, 14, 20, 20, 20, 35
How many telephone or onsite interviews have you completed?		0, 1, 1, 5	0, 1, 2, 3, 3, 5
I expect to complete a postdoc or nonacademic employment before starting a faculty position?	Yes	20 	7 
	No	3 	3 
My dream faculty position is (ONLY CHECK ONE):	Research Focused	6 	3 
	Teaching Focused	7 	2 
	50% Research/50% Teaching Focus	10 	5 
The AEESP Wiki website was helpful in preparing for this workshop?	Yes	16 	7 
	No	5 	0

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