

TOTAL REWARDS
INSTRUCTOR'S MANUAL

SHRM[®]

SOCIETY FOR HUMAN
RESOURCE MANAGEMENT

Managing a Salary Survey Project

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PROJECT TEAM

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Overview

This learning module is best used in an HR survey course to supplement total rewards content. The target audience is undergraduate students who have a working knowledge of basic HR topics and statistics (especially linear regression). A refresher on basic statistics may be required for students who do not have sufficient expertise to comprehend the analysis.

Audience

- Undergraduate and graduate students studying human resource management.

Duration

- 150 minutes (three 50-minute sessions).

Suggested Readings

Adams, J. (Ed.). (1965). *Inequity in social exchange (Vol. 2)*. New York: Academic Press.

Burke, L. (2008). *Designing a pay structure: Case study*. Retrieved August 18, 2010, from www.shrm.org/Education/hrededucation/Pages/DesigningPayStructureACaseStudyandIntegratedExercises.aspx.

Catan, T., & Kendall, B. (2010, April 9). U.S. steps up probe of hiring in tech. *The Wall Street Journal*. Retrieved August 18, 2010, from <http://online.wsj.com/article/SB10001424052702304703104575174293867620832.html>.

Culpepper Associates. (2009). *Geographic pay differential practices*. Retrieved August 18, 2010, from www.culpepper.com/eBulletin/2009/GeoPayDifferentialPractices.asp.

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eHow. *How to use Gantt Chart for project management*. Retrieved August 18, 2010, from www.ehow.com/how_2156387_use-gantt-chart-project-management.html#ixzz0qrydlyTO.

Hackman, J., & Oldham, G. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, 16(2), 250-279.

Halley, R. (2004). Measures of central tendency, location, and dispersion in salary survey research. *Compensation and Benefits Review*, 36(5), 39-52.

Milkovich, G., Newman, J., & Gerhart, B. (2011). *Compensation* (10th ed.). New York: McGraw-Hill.

MindTools. (n.d.). *Gantt Charts: Planning and scheduling complex projects*. Retrieved August 18, 2010, from www.mindtools.com/pages/article/newPPM_03.htm.

Peters, M., & Williamson, C. (2007, March 9). How unions are using the Sherman Antitrust Act and wage surveys to organize the healthcare industry. *HealthLeaders Magazine*.

Sahl, R. J. (1991). Job-content salary surveys: Survey design and selection features. *Compensation and Benefits Review*, 23(3), 14-21.

SHRM. (2005). *Salary surveys: Can I contact other local organizations in my area to get a gauge on merit projections or other compensation and benefits data?* Retrieved August 18, 2010, from www.shrm.org/TemplatesTools/hrqa/Pages/CMS_013693.aspx.

SHRM. (2008). *Building a market-based pay structure from scratch*. Retrieved August 18, 2010, from www.shrm.org/Research/Articles/Articles/Pages/BuildingaMarket-BasedPayStructureFromScratch.aspx.

SHRM. (2008). *Compensation philosophy: What are the advantages or disadvantages or a lead, match, or lag compensation strategy?* Retrieved August 18, 2010, from www.shrm.org/TemplatesTools/hrqa/Pages/CMS_024253.aspx.

SHRM. (2008). *Salary surveys: My company can't afford to purchase new salary and wage survey data each year*. Retrieved August 18, 2010, from www.shrm.org/TemplatesTools/hrqa/Pages/MycompanycantaffordtopurchasenewsalaryandwagesurveydataeachyearIsthereanywaythatwecanuselastyear'ssurveydata.aspx.

SHRM. (2009). *2009 examining employee benefits in a fiscally challenging economy*. Retrieved August 18, 2010, from www.shrm.org/Research/SurveyFindings/Articles/Documents/09-0295_Employee_Benefits_Survey_Report_spread_FNL.pdf.

SHRM. (2010). *How to establish salary ranges*. Retrieved August 18, 2010 from www.shrm.org/TemplatesTools/HowtoGuides/Pages/HowtoEstablishSalaryRanges.aspx.

Skonberg, J., Notestine, K., & Sud, N. (2006). *Sharing compensation or benefit information between competitors may violate antitrust laws*. Retrieved August 18, 2010, from http://www.lorman.com/newsletters/article.php?article_id=570&newsletter_id=124&category_id=1.

Wildman, H. (n.d.). *Employer guidelines for avoiding antitrust issues related to participation in professional groups*. Retrieved August 18, 2010, from www.wildman.com/index.cfm?fa=publications.libArticle&artid=5ABA1D25-BDB9-4A10-53A287E8D0BCD909.

Zeidner, R. (2009). *Compensation surveys offer a strategic edge*. Alexandria, VA: SHRM.

Session 1: Fundamentals of Competitive Pay (50 Minutes)

Learning Objectives

By the end of this session, students will be able to:

- Explain equity theory and equity issues.
- Explain compensation philosophy and market strategies.
- Explain purposes of salary surveys.
- Research market information on benchmark jobs.

Topic	Activity	Media	Time
Introduction	<p>This learning module is intended for an audience with a working knowledge of job evaluation and internal equity issues. A high-level treatment of internal equity is included; however, this learning module addresses external equity and market competitiveness in pay practices. If you would like a refresher on job evaluation, please see Milkovich, Newman & Gerhart (2011), pages 135-148.</p> <p>This module is primarily focused on conducting a salary survey in the United States; it does not address global issues.</p> <p>Introduce the learning objectives and explain that three class sessions will be devoted to the content. One take-home activity and two in-class activities are used to involve students in the module content and to provide hands-on learning opportunities. Readings from the Milkovich text (2011), pages 128-160, can be used to supplement a general HR text used in a survey course.</p>	<p>PPT slides 1-4</p> <p>Milkovich, pages 128-160</p>	5 min.
Appropriate use of module	<p>This learning module is best used in an HR survey course to supplement total rewards content. The target audience is undergraduate students who have a working knowledge of basic HR topics and statistics (especially linear regression). A refresher on basic statistics may be required for students who do not have sufficient expertise to comprehend the analysis.</p>		

Module activities	Three activities are included. The first activity asks students to conduct online research to investigate market pay rates for six jobs using at least two different web sites. The activity demonstrates the variability in data available and requires students to conduct basic statistical analysis. The second activity asks students to plan a salary survey project using a Gantt chart. This activity demonstrates the importance of planning and organizing the project and introduces a useful project management tool. The last activity asks students to analyze sample survey data using basic statistical techniques. This activity further challenges students to generate a market pay line using regression calculations. This activity demonstrates the link between internal job evaluation results and market pay rates.		
Motivation theories	A concise review of the major motivation theories is presented to tie employee motivation to the rewards provided by the organization. Because of its importance to compensation, equity theory is explained in depth while the remaining theories are discussed only briefly.	PPT slide 5	
Equity considerations	If you need a refresher on equity theory, the following web sites give a good description of the tenets of this theory: www.businessballs.com/adamsequitytheory.htm www.mindtools.com/pages/article/newLDR_96.htm Review the objectives for compensation in terms of acquiring and rewarding talent to drive organizational performance within the financial limits of the organization. Basic economics of supply and demand can be reviewed to link individual and organizational decisions to the macro-economy. Review the concept of total rewards. Emphasize that employees evaluate more than base salary when considering employment opportunities. The entire compensation and benefits package must be considered during the planning process.	PPT slides 6-9 Milkovich, page 83	5 min.
Compensation philosophy and mix	You may wish to review the SHRM article on compensation philosophy (SHRM, 2008) and pages 220-228 of the Milkovich text to prepare for this discussion. Explain the two generic compensation philosophies (entitlement and performance) and how they drive different compensation mixes. The discussion of fixed and variable pay provides the opportunity to link HR to accounting concepts and methods used to control labor costs.	PPT slides 10-14 SHRM (2008) Milkovich, pages 220-228	10 min.
Purposes of a salary survey	See notes on PowerPoint slides.	PPT slides 15-17 Milkovich, page 240	5 min.
Legal considerations	It is assumed that students have previously learned about provisions in the Fair Labor Standards Act of 1938, the Equal Pay Act of 1963 and the Lilly Ledbetter Fair Pay Act of 2009. Legal issues covered in this module relate specifically to obtaining external competitive salary information.	PPT slide 18	5 min.
Make or buy decision	Links are provided to representative web sites for each type of data source. A quick visit to each site is useful to show students what is available from each source.		
See notes on the PowerPoint slide for evaluating a vendor survey.		PPT slides 19-21	10 min.

<p>Activity 1</p>	<p>Explain Activity 1: Comparing benchmark jobs. Activity 1 is to be completed between Session 1 and Session 2. A separate handout explains the assignment in greater detail. An exemplar response is provided for the instructor.</p> <p>You may wish to review the article “Geographic Pay Differential Practices” (Culpepper, 2009) and possibly assign it to students. Explain that the task is to research six jobs in the same industry in two geographic areas (Cleveland and Omaha). Students will be assigned to groups (you can determine the best way to form groups), and everyone will complete the same task.</p> <p>Step 1: Groups are to access salary data from at least two different sources. Note on the exemplar response that several sources utilize the same original data and therefore will return identical results.</p> <p>Step 2: Groups may have to calculate averages if only minimum and maximum pay rates are provided. They are to create a table (either in Excel or in Word) with the average pay rates. The average can be a combination of data from all sources or the groups may select one “credible” source to use. They should explain how they decided which data to report.</p> <p>Step 3: Groups will analyze and compare the pay rates between the geographic areas. Groups may need to research additional economic factors (such as the cost of living) in each area to justify the pay differences they find.</p> <p>Step 4: Groups will determine which jobs are paid more than others and offer a reasonable explanation for those pay differences. Looking at the job descriptions and requirements should make it obvious that education is a major factor in pay levels for these jobs.</p> <p>Step 5: Examine CareerOneStop and the Occupational Outlook Handbook as they are good sources of projections for various occupations. CareerOneStop provides better information on a regional basis. In regions where the projected growth rate is below the national projected growth rate, we would expect that pay rates would begin to fall (according to the law of supply and demand). The opposite would be expected in regions with projected growth rates higher than the national projection.</p> <p>Step 6: Students may find reasonable justifications for choosing either of the two cities in which to locate. You are looking for responses that indicate the groups considered multiple aspects of the dilemma before making the final choice. If the rationale is logical and can be supported, either decision is acceptable.</p> <p>Instruct the groups to complete the assignment and to have their reports ready for discussion at the next class session. The nature of this assignment makes it easy to devise a divide-and-conquer strategy. Groups can easily break the task into several discrete elements that can be delegated to each member. Compiling the final report should not be a major process.</p>	<p>PPT slide 22</p> <p>Activity 1 handout</p> <p>Culpepper (2009) article</p>	<p>5 min.</p>
<p>Wrap-up</p>	<p>Review the importance of equity issues in compensation planning and administration. Reinforce the idea that establishing a compensation philosophy allows organizations to attract, retain and reward high-quality talent in a cost-effective manner. Explain the varied quality of data available from different sources and the importance of using credible, accurate data to make pay decisions.</p>	<p>PPT slide 23</p>	<p>5 min.</p>

Session 2: Planning a Salary Survey (50 Minutes)

Learning Objectives

By the end of this session, students will:

- Research and analyze readily available pay information.
- Explain the scope of the survey (competitors, jobs, geographic areas).
- Explain the data to collect.
- Plan a survey using a Gantt chart.

Topic	Activity	Media	Time
Debrief	<p>Review Activity 1: Comparison of pay rates for benchmark jobs in two geographic areas. This activity demonstrates the variability of available data, the geographic differences in pay and the issues involved in meeting competitive pressures. A recommended debrief is to have pairs of groups meet and compare their results. It is unusual for all groups to obtain identical results, and this should prompt a discussion about why they found inconsistent information. A plenary discussion can follow, in which the groups can share the various web sites used in their research. Of particular value is a discussion on the final question about where to locate the facility. Explore opposing views and justifications for selecting the city. The responses can be recorded on a flipchart or blackboard.</p> <p>Through completing Activity 1, students will discover that publicly available, easily accessible information is not always the best source of data for an organization to validate its pay practices. After discussing the merits of using publicly available data, introduce the development of a custom survey for the organization. To gather all relevant information and to obtain information on all jobs, organizations can create surveys for their own purposes. The steps involved in the process are explained on the PowerPoint slides. The survey project is developed and carried out using project management tools.</p>	Flipchart or blackboard	10 min.
Review of prior material and introduction of session	<p>Review the key points from the first session. Ask students questions regarding:</p> <ul style="list-style-type: none"> • The importance of equity perceptions. • The three compensation philosophies (lead, lag, match). • The purposes of a salary survey. • The sources of salary information that can be used. <p>Introduce the learning objectives for this session.</p> <p>This session expands on the foundation established in Session 1 and focuses on the planning and execution of a custom salary survey using project management techniques. This session introduces the use of planning tools such as a Gantt chart to facilitate the survey project.</p>	PPT slide 24 Student input	5 min.

Planning the survey project	Refer to slides 7-9 to review the planning process on how to determine the compensation philosophy and compensation mix. Slides 19 and 20 are introductory and provide a framework for content presented in the session. An overview of the general planning process is sufficient at this point because details can be found on slides 21-26.	PPT slides 25-26 SHRM 2008 research article Milkovich (2011), pages 241-252	3 min.
Background information and timeliness of data	Refer to slides 7-13 covered in Session 1 for details regarding compensation philosophy, compensation mix, purposes of a compensation survey and legal considerations. A review of the SHRM (2008) article "My Company Can't Afford New Salary and Wage Data Every Year" may provide useful background information.	PPT slide 27 Culpepper (2009)	2 min.
Competitors, jobs and information to include	See notes on PowerPoint slides.	PPT slides 28-32 Milkovich (2011), pages 246-250 Stahl (1999)	
Design the survey instrument	Links are provided to several free survey web sites. You may want to show one of these web sites to the class.	PPT slide 33	
Activity 2	<p>Explain Activity 2: Using a Gantt chart to plan the survey project. Activity 2 is to be completed in class at the end of the session. A separate handout explains the assignment in greater detail. An exemplar response is provided for the instructor.</p> <p>Activity 2 is a group activity. Begin by assigning students to groups of 4-5 participants. Distribute the assignment handout and 25 notes with adhesive backing (sticky notes) to each group.</p> <p>You may wish to review the eHow and MindTools web links to familiarize yourself with the use of a Gantt chart if you have no experience with one. Explain that the task is to determine and schedule a salary survey project.</p> <p>Step 1: Ensure that the groups have sufficient work surfaces to handle the sticky notes. A long work table or desk works best. The framework for the project is listed on Slides 19 and 20. Groups may "drill down" to tasks such as "choose a compensation philosophy" and "choose a compensation mix" as two individual steps. Others may aggregate this into one step "gather background information." Allow for different approaches and let groups decide how detailed they want the task list to be.</p> <p>Step 2: The groups will have to come up with their best estimates of how long each task will take. Expect a wide range of answers. There are really no right or wrong answers, but look for something reasonable and logical. Duration of tasks should be in days.</p> <p>Step 3: Give the groups some room to work. They will discuss and decide in what order the tasks should be completed. Expect some rearranging and haggling over the order of tasks. Encourage them to think about what task must be completed before another and what tasks could be done at the same time. This step is the essence of the planning process and should generate active discussion.</p> <p>Step 4: Each group has a sample Gantt chart (with two example tasks listed) for reference. It is to be expected that most students have never worked with a Gantt chart before, and they will need an example to get them started. It is recommended that the Gantt chart be completed in pencil. Although the groups have spent time arranging their tasks, as they put them on the Gantt chart, they may notice some inconsistencies or conflicts.</p> <p>Encourage groups to scan the columns to identify weeks in which multiple tasks are scheduled. Ask them to think about resource limitations (time, manpower, etc.) during those weeks and to consider whether or not all tasks can be accomplished in that time.</p>	PPT slide 34 Activity 2 handout Sticky notes	15 min.

Debrief	Review Activity 2: Compare tasks identified, task order and the task itself. Discuss the implications of resource limitations and scheduling conflicts. Review how the Gantt chart planning process helps identify obstacles in advance and can help manage the project.	Activity 2 handout Flipchart or whiteboard	5 min.
Wrap-up	Review the process of planning and conducting a salary survey in a systematic, thoughtful manner. Timeliness of data and the purpose for the survey guide the survey design process. Reinforce the idea that the organization must focus on specific participants, jobs and information to achieve the desired benefits from the survey process. Ideally, schedule Session 3 to meet in a computer lab. This will facilitate data analysis. Alternatively, ask students to bring a calculator to the next session.	PPT slide 35	5 min.

Session 3: Analyze Survey Data (50 Minutes)

Learning Objectives

By the end of this session, students will be able to:

- Explain issues involved in collecting survey data.
- Demonstrate statistical techniques used to analyze survey data.
- Explain how to deal with internal pay issues.

Topic	Activity	Media	Time
Review previous material and introduce session	<p>Review the key points from Session 2. Ask students questions regarding:</p> <ul style="list-style-type: none"> • How to select survey participants. • How to determine jobs to include in the survey. • How to decide what information to collect. <p>Introduce the learning session objectives.</p> <p>This session concludes the module on conducting a salary survey. By the end of this module, students will have a basic understanding of how equity concerns can be addressed and how organizations obtain the data needed to ensure they are compensating employees in line with their stated compensation philosophy.</p>	<p>PPT slide 36</p> <p>Student input</p>	5 min.
Collecting data, analyzing survey results and dealing with outliers	<p>See notes on PowerPoint slides.</p>	<p>PPT slides 37-39</p> <p>Stahl (1991)</p> <p>Milkovich (2011), page 258</p>	5 min.
Statistical analysis	<p>You may want to read the Halley (2004) article to prepare for this section of the lecture. It is a particularly comprehensive article on survey data analysis relative to salary surveys.</p> <p>A dataset is provided on page 10 for the instructor. It shows how to calculate the simple mean, trimmed mean, weighted mean, median, mode, range and interquartile range.</p>	<p>PPT slides 40-41</p> <p>Flip chart, whiteboard</p> <p>Halley (2004)</p> <p>Milkovich (2011), pages 258-260</p>	10 min.

Sample dataset to use for demonstrating basic data analysis

Respondent	n	Average Pay	Weighted (n*Average Pay)
Company A	3	\$20,000	\$60,000
Company B	8	\$26,000	\$208,000
Company C	4	\$28,000	\$112,000
Company D	9	\$32,000	\$288,000
Company E	6	\$34,000	\$204,000
Company F	7	\$34,000	\$238,000
Company G	2	\$52,000	\$104,000
	39		\$1,214,000
Mean	\$32,286		$(20,000+26,000+28,000+32,000+34,000+34,000+52,000)/7$
Trimmed	\$30,800		$(26,000+28,000+32,000+34,000+34,000)/5$
Weighted	\$31,128		$[(3*20,000)+(8*26,000)+(4*28,000)+(9*32,000)+(6*34,000)+(7*34,000)+(2*52,000)]/(3+8+4+9+6+7+2)$ $= (1,214,000/39)$
Median	\$32,000		Value that occurs in the middle of the distribution.
Mode	\$34,000		Value that occurs most frequently.
Range	\$32,000		Highest-lowest
Percentile			Percentile = $p(n+1)$ $= p(6+1)$ $= p(7)$ 75th percentile = $.75 (7) = 5.25$ or the 5th data point (34,000) 25th percentile = $.25 (7) = 1.75$ or the 2nd data point (26,000)
Interquartile range	\$8,000		75th percentile pay rate - 25th percentile pay rate $= (34,000-26,000)$ $= 8,000$

Market pay line	<p>Using the data below, demonstrate how to create the market pay line. Statistical functions in Excel allow for a simple calculation of the regression equation, slope and the y-intercept. The x-axis is the job evaluation point value; the y-axis is the pay rate for each job. In Excel, the statistical function “intercept” calculates the y-intercept. The statistical function “slope” calculates the slope of the regression line. The recommended procedure is to enter the data into Excel and run the calculations yourself. If you are holding the session in a computer lab, projecting on the screen the steps in Excel to conduct the analysis will help students complete this activity. Use “chart layout 9” in Excel to construct the market pay line as shown on slide 40. This chart layout returns the slope and y-intercept and allows you to double-check your calculations.</p> <p>The regression equation for this dataset is:</p> $Y = 294.52 (x) - 12,585$	<p>PPT slides 42-43</p> <p>Flipchart, whiteboard</p> <p>Milkovich (2011), pages 261-264</p> <p>Excel</p>	10 min.
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Sample data to demonstrate the construction of a market pay line:

Job name	Job evaluation points	Pay rate
Receptionist	120	\$25,000
Bookkeeper	175	\$38,000
Accountant	245	\$55,000
Engineer	310	\$82,000

<p>Small group work: Analyzing survey data activity</p>	<p>Explain Activity 3: Analyzing sample survey data. Activity 3 is to be completed in class at the end of Session 3. A separate handout explains the assignment in greater detail. An exemplar response is provided for the instructor.</p> <p>It is strongly recommended that this session be conducted in a computer lab that has a projector. This will facilitate data entry, analysis and comparison of results.</p> <p>To prepare this assignment, you may want to enter the sample data into an Excel spreadsheet that can be electronically distributed to students. This will significantly reduce the time it takes to complete the activity and will reduce errors in data entry. If students are to manually complete the activity, you will have to drop the regression calculations from the activity and have groups manually plot the data.</p> <p>Activity 3 is a group activity. Begin by assigning students to groups of 4-5 participants. Distribute the assignment handout and sample data to each group.</p> <p>Step 1: The sample data contains responses from eight survey participants. Students can scan the results to identify any outliers or anomalies. While a few data points may be a bit out of range, there are no true outliers. Therefore, all responses should be used in the analysis.</p> <p>Step 2: Each column in the sample data contains the responses for a specific job. Each row represents a participant's response. Students can manually calculate the means, median and modes for each job or they can use Excel to generate the results. This should be a relatively straightforward process that does not require high-level analytical skills. The table with all of the required calculations is provided to instructors in the exemplar response.</p> <p>Step 3: Students will plot each job based on the job evaluation points assigned to each job (on the horizontal axis) and the average pay rates they calculated in Step 2 (on the vertical axis). Data should be sorted in ascending order by average pay rate. The plotting procedure in Excel is quite simple. Using the "line chart" function in the graphics mode, students should follow the prompts to select the data series for each axis. Excel will automatically generate the line chart. If students manually plot, they can use graph paper and plot each point based on the two coordinates (job evaluation points and average salary).</p> <p>Step 4: Excel's statistical functions include "intercept" and "slope." Using the data from Step 3 and following the prompts, students will determine the values of the y-intercept and the slope of the regression line. Inserting these values into the standard regression equation $[Y=m(x) + b]$ will create the regression equation for this data set. It is a simple matter of replacing "x" with the job evaluation point values for the two jobs (ER technician and admissions clerk) to determine the predicted pay rates for those jobs.</p> <p>If you are unable to conduct this session in a computer lab, students can do an alternate Step 4 and manually estimate the pay rates for the two jobs based on the freehand regression line.</p>	<p>Slide 44</p> <p>Excel</p> <p>Activity 3 handout</p> <p>Milkovich (2011), pages 258-264</p> <p>15 min.</p>
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Debrief	Review Activity 3. Discuss the different results obtained if different measures of central tendency are used.	Activity 3 handout Flipchart or whiteboard	5 min.
Dealing with pay issues	See notes on PowerPoint slides.	PPT slide 45	3 min.
Wrap up	This concludes Session 3 and the Managing a Salary Survey Project learning module.	PPT slides 46-47	2 min.



Appendices: Activity Handouts and Exemplar Responses for Instructors

ACTIVITY 1: COMPARING BENCHMARK JOBS IN TWO METROPOLITAN AREAS

Geography often accounts for significant differences in pay rates for the same job. When employees evaluate where to work, they take into consideration where they can earn the highest value for their services. Likewise, employers often attempt to locate facilities in areas with lower prevailing wages to keep their labor costs down.

You will research the following benchmark jobs in the health care industry. These jobs are found in most major metropolitan areas and most require education beyond high school.

1. Dentist.
2. Dental hygienist.
3. Pharmacist.
4. Physician's assistant.
5. Physical therapist.
6. Registered nurse.

Using online resources, determine the pay rate for each job and compare the wage rates for those jobs in Cleveland, Ohio, and Omaha, Neb. Obtain information from at least two different sources. Be sure to read the job descriptions to ensure that you are comparing the “same” job. Suggested pay rate resources include (but are not limited to):

- Salary.com
- Salary.nytimes.com
- Payscale.com
- Bureau of Labor Statistics
- Professional organizations for each profession

1. Identify your sources of information.
2. Create a table showing the average pay rate for each job. State what information you used in the table. Were any data sources judged to be of higher or lower quality? How did you make that determination?
3. Does one geographic area generally pay more than the other? Explain why you think that might be. (You may need to do additional research on the cost of living in each area.)
4. Which jobs pay the highest and the lowest? Is this what you expected? What factors might explain the difference in pay rates?
5. What is the occupational outlook for each occupation in Cleveland and Omaha? (Check multiple sources such as CareerOneStop and the Occupational Outlook Handbook.) How might this affect the differences in pay rates between the two cities?
6. If you were to make a recommendation to an employer that was deciding where to locate a facility, what would you recommend based on your research? What other factors (outside of compensation) might you consider?

ACTIVITY 1: COMPARING BENCHMARK JOBS IN TWO METROPOLITAN AREAS

EXEMPLAR RESPONSE FOR INSTRUCTORS ONLY

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- Salary.com
- Salary.nytimes.com
- Payscale.com
- Bureau of Labor Statistics
- Professional organizations for each profession

Teaching note

You may wish to review the following research report from Culpepper Associates:

Culpepper Associates. (2009). *Geographic pay differential practices*. Retrieved August 19, 2010, from www.culpepper.com/eBulletin/2009/GeoPayDifferentialPractices.asp.

1. Identify your sources of information.

Monster.com uses the salary.com database and returns the same results. Therefore, searching on both sites will not provide any differences in reported salaries.

The New York Times also provides salary information based on salary.com's data. Therefore, this site will return the same results as searching on salary.com

Salarysearch.com allows only one free report per e-mail address. Students will have a difficult time searching for 12 reports (six jobs times two cities).

Payscale.com is difficult to use because the site requests more detailed information about the searcher's credentials. While this might actually result in more accurate information, it is virtually impossible for undergraduate students to have the relevant information needed to use this web site.

The Bureau of Labor Statistics (BLS) provides salary information for a wide range of occupations. The geographic regions are larger than those accessible on salary.com. BLS allows a search on 375 metropolitan areas, which encompass a larger geography than the zip code search permitted on salary.com.

2. Create a table showing the average pay rate for each job. State what information you used for the table. Were any data sources judged to be of higher or lower quality? How did you make that determination?

Salary information for the table below was retrieved from salary.com and the BLS (BLS.gov). An Excel spreadsheet details the salary information from both web sites. In the table below, salary information from salary.com is presented. Salaries are rounded to the nearest \$100. Salary.com provides the 25th and 75th percentile wage rates; the 50th percentile rates were manually calculated.

Salary.com data is more credible than the BLS data because it is more current and is taken from a more concentrated geographic area. BLS data is not as current and represents pay in a metropolitan statistical area (MSA).

Job Title	Salary.com 50th percentile annual wage rate in Cleveland, Ohio (44103)	Salary.com 50th percentile annual wage rate in Omaha, Neb. (68102)
Dental hygienist	\$62,900	\$59,400
Dentist	\$136,800	\$129,000
Pharmacist	\$110,400	\$104,200
Physician's assistant	\$87,500	\$82,500
Physical therapist	\$72,900	\$68,700
Registered nurse	\$64,300	\$60,700

3. Does one geographic area generally pay more than the other? Explain why you think that might be. (You may need to do additional research on the cost of living in each area.)

Salaries are 6 percent higher in Cleveland than in Omaha. According to information posted on Bankrate.com (www.bankrate.com), the cost of living in Cleveland is 12 percent higher than the cost of living in Omaha. Information posted on the CNN web site (www.cnnmoney.com) confirms that Cleveland's cost of living is approximately 11 percent higher than Omaha's. Therefore, one would expect pay rates to be higher in Cleveland than in Omaha for the same job. It is more expensive to live in Cleveland; therefore, employees would demand higher pay to live there.

4. Which jobs pay the highest and the lowest? Is this what you expected? What factors might explain the difference in pay rates?

Dentists earn the highest pay. This is to be expected because the level of education required to practice as a dentist is the highest of the six professions researched. Pharmacists earn the second highest pay rates because this profession also requires education beyond a bachelor's degree. Dentists and pharmacists hold positions that demand higher levels of responsibility than the others in this study. Dental hygienists, physician's assistants, physical therapists and registered nurses report to individuals such as a dentist or physician. This does not mean those jobs carry no responsibility. However, final authority to determine patient care is made at a level higher than theirs.

5. What is the occupational outlook for each occupation in Cleveland and Omaha? (Check multiple sources such as CareerOneStop and The Occupational Outlook Handbook.) How might this affect the differences in pay rates between the two cities?

Access the CareerOneStop (www.careeronestop.org) web site and click on "Explore Careers." Under "Occupations," click on "Explore trends." Under "Occupation Information," click on "Occupation Profile." On the Menu Search, click on "Healthcare Practitioners and Technical." Scroll down the list of occupations until you reach "Dental Hygienist." Follow the prompts to obtain the information for Nebraska and Ohio. This site provides the occupational outlook for each occupation at the state and national levels. State data are projected for 2006-2016, while national data are projected for the 2008-2018. Unfortunately, the data do not drill down to the city or metropolitan area levels. Students will have to assume that projections for each state apply to the particular cities they are studying.

The table below gives the projections at the national and state levels for the six occupations.

Job title	Projected occupation growth across the nation 2008-2018	Projected occupation growth in Ohio 2006-2016	Projected occupation growth in Nebraska 2006-2016
Dental hygienist	+36%	+21%	+51%
Dentist	+15%	+3%	+27%
Pharmacist	+17%	+15%	+32%
Physician's assistant	+39%	+23%	+49%
Physical therapist	+30%	+25%	+42%
Registered nurse	+22%	+23%	+34%

In all cases, except for registered nurses, the projected growth in occupations in Ohio is below national growth projections. In Nebraska, the opposite is true; growth rates for all six occupations exceed national projections. Therefore, the logical conclusion is that wage rates will rise faster in Nebraska than in Ohio during the next five years. Basic economics indicates that supply and demand forces will drive wage rates higher in Nebraska because the number of vacant jobs is expected to grow significantly. In Ohio, wage rates should level off or perhaps even drop due to the reduced demand for labor in these occupations.

6. If you were to make a recommendation to an employer that was deciding where to locate a facility, what would you recommend based on your research? What other factors (outside of compensation) might you consider?

This is not a cut-and-dried decision. At current pay rates, Omaha presents a more favorable business climate. The lower cost of living in Omaha should help attract qualified employees because their pay should stretch farther than it would in Cleveland. However, the demand for employees in Nebraska in these professions will outpace the national growth rate, and this is likely to drive the costs of labor higher.

According to the BLS, the April 2010 unemployment rates were 11 percent in Ohio and 5 percent in Nebraska, meaning that the economic climate in Nebraska is better than in Ohio at this time. Attracting employees may be easier in Ohio because there are more unemployed workers there, but at current wage rates, it will be more expensive to hire these workers.

A key factor is that the jobs in this study are all service-related. The decision of where to locate a facility must take into account the demand for medical services. Because the economy in Omaha is healthier than in Cleveland, it is likely that more people will be moving to Omaha in the future, while they may be leaving Cleveland. That should lead to increased demand for health-related services (as evidenced by occupational outlook projections). The recommendation would be to locate in Omaha because labor is currently cheaper and the cost of living is lower. However, the organization will have to be vigilant about maintaining a competitive position in the labor market and to continuously monitor wage rates.

Exemplar response for salary survey Activity 1 - Questions 1, 2, 3, 4

Job title	Salary.com										Higher location	% higher	BLS		Higher location	% higher	Average of 2 Sources
	CL 44103					OM 68102							CL MSA 50th	OM MSA 50th			
	25th	75th	50th	25th	75th	50th											
Dental hygienist	\$55,592	\$70,272	\$62,932	\$52,446	\$66,295	\$59,371						0.06	\$61,930	\$67,910	OMA	0.09	\$64,920
Dentist	\$118,841	\$154,701	\$136,771	\$112,115	\$145,945	\$129,030						0.06	\$127,110	\$152,320	OMA	0.17	\$139,715
Pharmacist	\$104,691	\$116,203	\$110,447	\$98,765	\$109,625	\$104,195						0.06	\$107,230	\$91,370	CLE	0.15	\$99,300
Physician's assistant	\$79,333	\$95,625	\$87,479	\$74,842	\$90,213	\$82,528						0.06	\$81,520	\$82,780	OMA	0.02	\$82,150
Physical therapist	\$67,562	\$78,175	\$72,869	\$63,738	\$73,750	\$68,744						0.06	\$76,920	\$65,290	CLE	0.15	\$71,105
Registered nurse	\$58,217	\$70,382	\$64,300	\$54,922	\$66,399	\$60,661						0.06	\$62,430	\$57,740	CLE	0.08	\$60,085

**Exemplar response for salary survey Activity 1 - Question 5
Projected occupational growth**

Job title	Careeronestop.com		
	OH	NE	National
Dental hygienist	21%	51%	36%
Dentist	30%	27%	15%
Pharmacist	15%	32%	17%
Physician's assistant	23%	49%	39%
Physical therapist	25%	42%	30%
Registered nurse	23%	34%	22%

ACTIVITY 2: USING A GANTT CHART TO PLAN THE SURVEY PROJECT

A Gantt chart is a useful tool to help manage a complex project like a salary survey. The Gantt chart is a visual representation of the steps in a project. It allows project team members to quickly identify tasks, deadlines and resource requirements.

To build a Gantt chart, you'll need to make a list of all the steps in the project. Then you must determine the order in which the tasks must be completed. Finally, you need to estimate the length of time each task will take to complete. When you've completed the preliminary planning, transfer all of that information to a Gantt chart.

You'll be using sticky notes to make the planning task a bit easier. There is a blank Gantt chart for your use, along with an example to get you started.

Step 1: Make a list of all steps in the project.

Identify each major step of the project. Write each step in the project on an individual sticky note. Refer to your notes from Sessions 1 and 2 so nothing important is left out.

Step 2: Determine the duration for each task.

Based on what you understand to be involved in completing each task, estimate the number of days the task will take to complete. Write your estimate (in days) on each sticky note next to the step.

Step 3: Determine the order of tasks.

Give yourself some room to work. Determine what tasks must come before or after other tasks. Arrange (and rearrange) the sticky notes in the most logical sequence based on group consensus. There may be tasks that can occur simultaneously. They will have the same order number.

Step 4: Transfer information to the Gantt chart.

When you are satisfied that you have the tasks in proper order, transfer each task to the Gantt chart in that order in the column titled "List of Activities." Transfer the duration of each task in the corresponding column titled "Days Duration."

Now you must determine the starting week for each task. Obviously, the first task will begin during the first week. The remaining tasks will start in the appropriate week based on the duration of preceding tasks and the critical tasks that must be completed before the task at hand. Shade in the weeks that the task is ongoing. (Assume a five-day workweek for all tasks).

For example, if the first task was "select jobs" and you determined that it should take 10 days to complete, you would enter "select jobs" in the "List of Activities" column, "10" in the "Days Duration" column and "1" in "Start Week" column. Shade in weeks one and two because this task will be ongoing for 10 days (two weeks). If your next task is "collect data," it cannot begin until after "select jobs" has been completed. Therefore, the earliest start week for "collect data" is week three. Enter "collect data" in the "List of Activities" column, "30" in the "Days Duration" column and "3" in the "Start Week" column. Shade in weeks three through eight because the task will be ongoing for six weeks.

Gantt Chart For Conducting a Salary Survey

#	List of Activities	Start Week	Days Duration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				

Gantt Chart For Conducting a Salary Survey – Example

#	List of Activities	Start Week	Days Duration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Select jobs	1	10																	
2	Collect data	3	30																	
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				

ACTIVITY 2: USING A GANTT CHART TO PLAN THE SURVEY PROJECT

EXEMPLAR RESPONSE FOR INSTRUCTORS ONLY

A Gantt chart is a useful tool to help manage a complex project like a salary survey.

A Gantt chart is a visual representation of the steps in the project. It allows project team members to quickly identify tasks, deadlines and resource requirements.

To build a Gantt chart, you'll need to make a list of all the steps in the project. Then you must determine the order in which the tasks must be completed. Finally, you need to estimate the length of time each task will take to complete. When you've completed the preliminary planning, transfer all of your information to a Gantt chart.

You'll be using sticky notes to make the planning task a bit easier. There is a blank Gantt chart for your use, along with an example to get you started.

Teaching note

Required supplies:

- 25 (3" x 3" or larger) sticky notes for each group.
- Copies of the Gantt chart template and example for students.
- Copies of the Activity 2 handout.
- Pencils.

Step 1: Make a list of all steps in the project.

Identify each major step of the project. Write each step in the project on an individual sticky note. Refer to your notes from Sessions 1 and 2 so nothing important is left out.

The group should write one task on each sticky note. Appropriate tasks include:

- *Establish compensation philosophy.*
- *Determine purpose of survey.*
- *Conduct job evaluation.*
- *Identify competitor/participants.*
- *Select jobs to include.*
- *Design survey instrument.*
- *Collect data.*
- *Analyze data.*

- *Compare with existing pay structure.*
- *Make adjustments.*
- *Implement changes.*

Step 2: Determine the duration for each task.

Based on what you understand to be involved in completing each task, estimate the number of days the task will take to complete. Write your estimate (in days) on each sticky note next to the step.

The groups will write the estimated duration on the sticky note for each task. It will be apparent which tasks will take longer than others.

Step 3: Determine the order of tasks.

Give yourself some room to work. Determine what tasks must come before or after other tasks. Arrange (and rearrange) the sticky notes in the most logical sequence based on group consensus. There may be tasks that can occur simultaneously. They will have the same order number.

Groups will have to decide in what order each task must occur. There are tasks that must precede others and tasks that can occur concurrently. Refer to the exemplar Gantt chart for the appropriate order of tasks.

Step 4: Transfer information to the Gantt chart template.

When you are satisfied that you have the tasks in proper order, transfer each task to the Gantt chart in that order in the column titled “List of Activities.” Transfer the duration of each task in the corresponding column titled “Days Duration.”

Now you must determine the starting week for each task. Obviously, the first task will begin during the first week. The remaining tasks will start in the appropriate week based on the duration of preceding tasks and the critical tasks that must be completed before the task at hand. Shade in the weeks that the task is ongoing. (Assume a five-day workweek for all tasks).

For example, if the first task was “select jobs” and you determined that it should take 10 days to complete, you would enter “select jobs” in the “List of Activities” column, “10” in the “Days Duration” column and “1” in “Start Week” column. Shade in weeks one and two because this task will be ongoing for 10 days (two weeks). If your next task is “collect data,” it cannot begin until after “select jobs” has been completed. Therefore, the earliest start week for “collect data” is week three. Enter “collect data” in the “List of Activities” column, “30” in the “Days Duration” column and “3” in the “Start Week” column. Shade in weeks three through eight because the task will be ongoing for six weeks.

Final Gantt charts will not be identical for every group. Groups will have different tasks, varying durations and start weeks. The exemplar chart is for your reference and provides a reasonable sample. Each group should produce a logical sequence of tasks and few scheduling conflicts. Notice on the exemplar Gantt chart that weeks 1, 3, 4, 5, 13, 14 and 15 have multiple tasks occurring (look down the columns to see multiple entries).

Gantt Chart For Conducting a Salary Survey – Exemplar Response for Instructors																					
#	List of Activities	Start Week	Days Duration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	Establish compensation philosophy	1	5																		
2	Determine purpose of survey	1	5																		
3	Conduct job evaluation	1	12																		
4	Determine competitor/participants	3	8																		
5	Select jobs to include	4	10																		
6	Design survey instrument	5	12																		
7	Collect data	7	30																		
8	Analyze data	12	20																		
9	Compare to existing pay structure	13	20																		
10	Make adjustments	16	5																		
11	Implement changes	17	5																		
12																					
13																					

ACTIVITY 3: ANALYZING SAMPLE SURVEY DATA

You conducted the salary survey and received responses from eight organizations. Luckily, all respondents answered every question, so you have eight data points for each job. You will now analyze the data to determine if you are paying within your pay policy guidelines.

The analysis will be much simpler if you use Excel. The alternative is to calculate all of the values manually.

Survey data and information regarding the internal job evaluation points for each job are provided on the following pages.

Step 1: Review the data to determine if there are any outliers.

Are there any atypical responses you need to address? Scan the survey data. If you identify outliers, determine how you will deal with them in the analysis.

Step 2: Calculate the measures of central tendency.

Create a table that lists each job in the rows and the measures of central tendency in the columns. Title the columns “Mean,” “Trimmed Mean,” “Weighted Average,” “Median” and “Mode.” Before starting your calculations, sort the data in ascending order. You’ll need data sorted in ascending order for some of your measures of central tendency.

Determine the measures of central tendency you will use when creating the market pay line. Discuss the merits of using the simple mean versus the trimmed or weighted means. Would using the median or mode make sense? You can even blend several of the measures if you believe it will result in a more accurate comparison.

Step 3: Plot the jobs on a market pay line.

If you are using Excel, create the chart using the “line chart” function. Your horizontal (X) axis will be the job evaluation points. Your vertical (Y) axis will be the average pay rate. In step 2, your group decided which measures of central tendency to use for the average pay rate. Follow the prompts in Excel to select your data. Excel will generate the market pay line for you after you have correctly selected the data.

If you are working by hand, manually create the chart and plot the points. Draw the market pay line freehand.

Step 4: Determine the regression equation and predict pay rates for jobs (Excel) or calculate percentiles and interquartile range (manual).

If you are working in Excel, use the statistical functions to determine the regression equation. You will need to calculate the y-intercept (m) using the “intercept” function and the slope (b) using the “slope” function. Follow the prompts to select the data series. Excel will return the results for the y-intercept and the slope. Your equation should follow this format:

$$Y = m(x) + b$$

where y = predicted pay rate

m = slope

x = job evaluation points

b = y -intercept

Your generic regression equation will have values for “ m ” and “ b .” However, the “ x ” value will be entered for each job you are predicting pay rates for.

Once you have determined the regression equation, calculate the predicted pay rates for the following jobs:

Emergency room technician – 220 job evaluation points

Admission clerk – 165 job evaluation points

Did the predicted pay rates fall within the rank order as you expected? If not, can you explain why they were not as you thought?

If you are working manually, you will be unable to determine the regression equation. Instead, calculate the pay rates at the 25th, 50th and 75th percentiles. Then, calculate the interquartile range (75th – 25th).

**SALARY SURVEY RESULTS
AVERAGE ANNUAL PAY RATE
MEDICAL/DENTAL PROFESSIONALS**

	Dental hygienist	Dentist	Pharmacist	Physician's assistant	Physical therapist	Registered nurse
Organization A	\$58,750	\$119,500	\$112,800	\$82,800	\$72,500	\$61,500
Number incumbents	12	8	7	21	16	67
Organization B	\$66,000	\$125,000	\$100,750	\$77,900	\$71,100	\$58,200
Number incumbents	4	4	2	9	7	42
Organization C	\$62,100	\$136,750	\$104,500	\$88,000	\$68,400	\$64,700
Number incumbents	8	3	4	12	9	38
Organization D	\$64,800	\$135,600	\$107,800	\$96,500	\$69,400	\$60,750
Number incumbents	7	5	6	10	5	34
Organization E	\$62,400	\$147,200	\$105,600	\$82,850	\$67,750	\$63,800
Number incumbents	22	14	11	34	43	148
Organization F	\$63,200	\$128,400	\$109,900	\$81,400	\$66,800	\$64,500
Number incumbents	4	2	3	8	6	29
Organization G	\$61,000	\$145,000	\$108,200	\$84,200	\$70,800	\$68,200
Number incumbents	15	9	11	18	26	114
Organization H	\$57,750	\$136,100	\$105,200	\$85,250	\$71,400	\$60,650
Number incumbents	3	1	2	7	11	47

**POINTS PER JOB
MEDICAL/DENTAL PROFESSIONALS**

Job Title	Points
Dental hygienist	200
Dentist	355
Pharmacist	320
Physician's assistant	260
Physical therapist	240
Registered nurse	215

Assume that the organization uses a point factor comparison method of internal job evaluation.

Point values can range from 25 to 364.

Points are totaled for each job to determine the job grade.

Job grades range from 1 to 11; each job grade has a 30-point range.

Grade 1 = 25-54 points

Grade 2 = 55-84 points

Grade 3 = 85-114 points

Grade 4 = 115-144 points

Grade 5 = 145-174 points

Grade 6 = 175-204 points

Grade 7 = 205-234 points

Grade 8 = 235-264 points

Grade 9 = 265-294 points

Grade 10 = 295-324 points

Grade 11 = 325-364 points

ACTIVITY 3: ANALYZING SAMPLE SURVEY DATA EXEMPLAR RESPONSE FOR INSTRUCTORS ONLY

Teaching note

This activity will work much more effectively if you can schedule the session in a computer lab where students have access to Excel. Steps 1 through 3 can be completed manually, but step 4 offers two alternatives in case you cannot secure a computer lab. You might wish to provide graph paper if you will be creating the market line charts by hand.

You conducted the salary survey and received responses from eight organizations. Luckily, all respondents answered every question, so you have eight data points for each job. You will now analyze the data so you can determine if you are paying within your pay policy guidelines.

The analysis will be much simpler if you use Excel. The alternative is to calculate all of the values manually.

Survey data and information regarding the internal job evaluation points for each job are provided on the following pages.

Step 1: Review the data to determine if there are any outliers.

Are there any atypical responses you need to address? Scan the survey data. If you identify outliers, determine how you will deal with them in the analysis.

Teaching note

There are no noteworthy outliers, and students should not need to address any outliers or anomalies.

EXEMPLAR SALARY SURVEY RESULTS FOR INSTRUCTORS

AVERAGE ANNUAL PAY RATE MEDICAL/DENTAL PROFESSIONALS						
	Dental hygienist	Dentist	Pharmacist	Physician's assistant	Physical therapist	Registered nurse
Organization A	\$58,750	\$119,500	\$112,800	\$82,800	\$72,500	\$61,500
Number incumbents	12	8	7	21	16	67
Organization B	\$66,000	\$125,000	\$100,750	\$77,900	\$71,100	\$58,200
Number incumbents	4	4	2	9	7	42
Organization C	\$62,100	\$136,750	\$104,500	\$88,000	\$68,400	\$64,700
Number incumbents	8	3	4	12	9	38
Organization D	\$64,800	\$135,600	\$107,800	\$96,500	\$69,400	\$60,750
Number incumbents	7	5	6	10	5	34
Organization E	\$62,400	\$147,200	\$105,600	\$82,850	\$67,750	\$63,800
Number incumbents	22	14	11	34	43	148
Organization F	\$63,200	\$128,400	\$109,900	\$81,400	\$66,800	\$64,500
Number incumbents	4	2	3	8	6	29
Organization G	\$61,000	\$145,000	\$108,200	\$84,200	\$70,800	\$68,200
Number incumbents	15	9	11	18	26	114
Organization H	\$57,750	\$136,100	\$105,200	\$85,250	\$71,400	\$60,650
Number incumbents	3	1	2	7	11	47
Simple mean	\$62,000	\$134,194	\$106,844	\$84,863	\$69,769	\$62,788
Weighted average	\$61,777	\$137,021	\$107,561	\$84,381	\$69,598	\$63,636
Trimmed mean	\$62,042	\$134,475	\$106,867	\$84,083	\$69,808	\$62,650
Range	\$8,250	\$27,700	\$12,050	\$18,600	\$5,700	\$10,000
25th percentile	\$58,750	\$125,000	\$104,500	\$81,400	\$67,750	\$60,650
75th percentile	\$64,800	\$145,000	\$109,900	\$88,000	\$71,400	\$64,700
Interquartile range	\$6,050	\$20,000	\$5,400	\$6,600	\$3,650	\$4,050
Trimmed mean						
Drop highest	\$66,000	\$147,200	\$112,800	\$96,500	\$72,500	\$68,200
	\$64,800	\$145,000	\$109,900	\$88,000	\$71,400	\$64,700
	\$63,200	\$136,750	\$108,200	\$85,250	\$71,100	\$64,500
	\$62,400	\$136,100	\$107,800	\$84,200	\$70,800	\$63,800
	\$62,100	\$135,600	\$105,600	\$82,850	\$69,400	\$61,500
	\$61,000	\$128,400	\$105,200	\$82,800	\$68,400	\$60,750
	\$58,750	\$12,5000	\$104,500	\$81,400	\$67,750	\$60,650
Drop lowest	\$57,750	\$119,500	\$100,750	\$77,900	\$66,800	\$58,200
Average remaining 6 values	\$62,042	\$134,475	\$106,867	\$84,083	\$69,808	\$62,650

Step 2: Calculate the measures of central tendency.

Create a table that lists each job on the rows and the measures of central tendency on the columns. Title the columns “Mean,” “Trimmed Mean,” “Weighted Average,” “Median” and “Mode.” Before starting your calculations, sort the data in ascending order. You’ll need data sorted in ascending order for some of your measures of central tendency.

Teaching note

The table with all calculations is shown below.

Job Title	Simple Mean	Weighted Average	Trimmed Mean	Median	Mode
Dental hygienist	\$62,000	\$61,777	\$62,042	\$62,250	\$61,550
Dentist	\$134,194	\$137,021	\$134,658	\$135,850	\$146,100
Pharmacist	\$106,844	\$107,561	\$106,867	\$106,700	\$105,400
Physician’s assistant	\$84,863	\$84,381	\$84,083	\$83,525	\$84,725
Physical therapist	\$69,769	\$69,598	\$69,808	\$70,100	\$71,100
Registered nurse	\$62,788	\$63,636	\$62,446	\$62,650	\$59,425

Determine the measures of central tendency you will use when creating the market pay line. Discuss the merits of using the simple mean versus the trimmed or weighted means. Would using the median or mode make sense? You can even blend several of the measures if you believe it will result in a more accurate comparison.

Teaching note

The weighted average is the most appropriate measure of central tendency. The weighted average will be used for the remainder of the questions in this assignment. Groups may elect to use a different measure, and their answers to the remaining questions will not match the exemplar answers identically but should be relatively close.

Step 3: Plot the jobs on a market pay line.

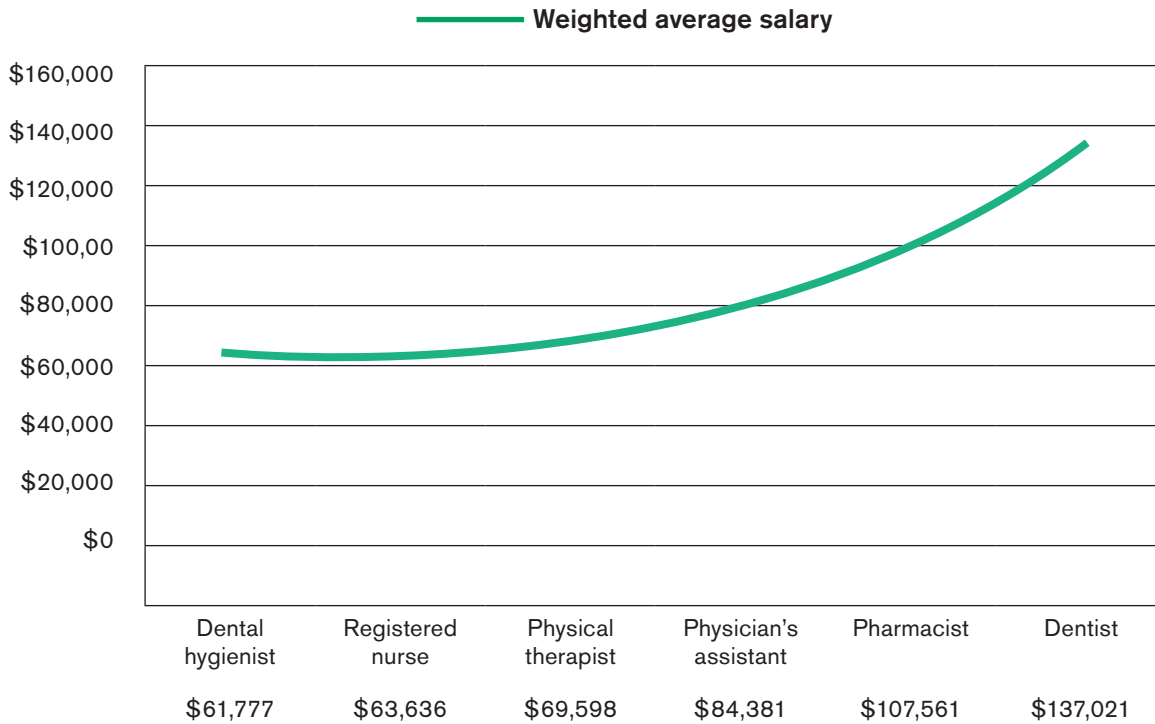
If you are using Excel, create the chart using the “Line Chart” function. Your horizontal (X) axis will be the job evaluation points. Your vertical (Y) axis will be the average pay rate. In Step 2, your group decided which measures of central tendency to use for the average pay rate. Follow the prompts in Excel to select your data. Excel will generate the market pay line for you after you have correctly selected the data.

If you are working by hand, manually create the chart and plot the points. Draw the market pay line freehand.

Exemplar Survey Results
GRAPHS & REGRESSION
MEDICAL/DENTAL PROFESSIONALS

Data have been sorted in ascending order by weighted average salary.

Job Title	Points	Weighted Average Salary
Dental hygienist	200	\$61,777
Registered nurse	215	\$63,636
Physical therapist	240	\$69,598
Physician's assistant	260	\$84,381
Pharmacist	320	\$107,561
Dentist	355	\$137,021



Step 4: Determine the regression equation and predict pay rates for jobs (Excel) or calculate percentiles and interquartile range (manual).

Teaching note

It is possible to determine the regression equation manually using matrix algebra; however, very few students would be familiar with that method, and it is too complex to teach students for the purposes of this activity.

If you are working in Excel, use the statistical functions to determine the regression equation. You will need to calculate the y-intercept (m) using the “Intercept” function and the slope (b) using the “Slope” function. Follow the prompts to select the data series. Excel will return the results for the y-intercept and the slope. Your equation should follow this format:

$$Y = m(x) + b$$

where y = predicted pay rate

m = slope

x = job evaluation points

b = y-intercept

Your generic regression equation will have values for “m” and “b.” However, the “x” value will be entered for each job you are predicting pay rates for.



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Teaching note

Y-intercept = -39994

Slope = 480.46

Regression equation using weighted average pay rates:

Predicted pay rate = $480.46(x) - 39994$

.....

Once you have determined the regression equation, calculate the predicted pay rates for the following jobs:

Emergency room technician – 220 job evaluation points

Admission clerk – 165 job evaluation points

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Teaching note

Predictions for jobs not on survey (rounded to nearest \$100)

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Emergency room technician – 220 points

ER tech predicted pay = $480.46(220) - 39,994$

ER tech predicted pay = \$65,700

Admissions clerk – 165 points

Clerk predicted pay = $480.46(165) - 39,994$

Clerk predicted pay = \$39,300

Did the predicted pay rates fall within the rank order as you expected? If not, can you explain why they were not as you thought?

Yes. The table below shows all jobs in the activity and their predicted pay rates. You can see that the admissions clerk is the lowest paid and the ER technician's pay rate falls between a registered nurse and a physical therapist, jobs of lower and higher point values.

Salaries for all jobs in the activity

Job Title	Points	Weighted Average Salary
Admissions clerk	165	\$39,300
Dental hygienist	200	\$61,777
Registered nurse	215	\$63,636
ER technician	220	\$65,700
Physical therapist	240	\$69,598
Physician's assistant	260	\$84,381
Pharmacist	320	\$107,561
Dentist	355	\$137,021

If you are working manually, you will be unable to determine the regression equation. Instead, calculate the pay rates at the 25th, 50th and 75th percentiles. Then, calculate the interquartile range (75th – 25th).

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Teaching note

Refer to the table in Step 2, which provides the 25th and 75th quartiles along with the interquartile range.

The median is the 50th percentile.

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