

represented in the group. Bill Hills from Naperville and Sharon Pelc from Cahokia pretty well sum up the feeling of the teachers after the fourth session (January 30 - February 1). Bill, "the information I'm getting is not theory but something I need to improve my program . . . someone is always over my shoulder giving me a hand." Sharon, "the look but don't touch attitude is dropped . . . I only wish my college education was half this practical . . . my hands are always dirty . . . maybe that's the way it should be."

The Illinois attempt to de-school horticultural education with a blend of industry participation in which learning takes place in the marketplace is a simple and fascinating approach

to the problem. The precise form that the education blend might finally take cannot, of course, be discerned at this point and, in any event, it will surely be dynamic once local teachers and industry get their oars in the pot. We'll have to wait right now for the next step in the de-schooling process. As the fifteen 'Seedstock' teachers push ahead we will sketch the path.

One thing for sure, the horticultural industry in Illinois has made an opening bid in not opting for a black tie educational program in horticulture. What's the industries' bid going to be in other states?

A Comparative and Factor Analytic Study of the Knowledges and Skills Needed in Agricultural Supply Businesses

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Agricultural supply programs at the junior college level in Illinois started with one program in 1964. Since that time, programs have emerged in various stages of development in many of the junior colleges.

Because many of the agricultural supply programs in Illinois junior colleges were in their infancy, it seemed desirable to determine (1) whether there was agreement with regard to the knowledge and skills needed by employees in this field among the student trainees who had been on placement, the employers where the students were placed, and the instructors who taught the agricultural supply courses that the student trainees were to take while on campus, (2) if there were differences among the ratings of agricultural supply knowledges and skills given by employers in the various types of agricultural supply businesses, and (3) if factor analysis could be used to group knowledges and skills into meaningful instructional categories.

Answers to these questions were sought in a study conducted by the researchers with the cooperation of eight junior colleges in Illinois.

It was anticipated that the information gained by this study would be of assistance to instructors in planning educational experiences and adjusting programs to meet the expressed needs of the student trainees and their employers.

Procedures

To answer the questions posed, a 100-item questionnaire of knowledges and skills essential to agricultural supply programs gleaned from the literature along with some distractors was developed and mailed to three populations. These populations were instructors in agricultural supply programs, student trainees who had completed on-the-job training in an agricultural supply business, and the employers of the businesses in which the students were placed. Each individual in the three populations was asked to rate the degree to which the knowledges and skills are essential for an employee in an agricultural supply business to know or be able to do. Responses were recorded on a nine-point scale which ranged from very essential to not essential.

Response to the mailed questionnaire included 54 student trainees, 56 employers, and 14 instructors; 68.4 percent, 71.8 percent, and 100.0 percent, respectively.

Results

Significant differences at the .05 level among the mean ratings given by the employers, student trainees, and instructors to the agricultural supply knowledges and skills were obtained for these items when the analysis of variance procedure was employed: filling out order blanks, mixing chemicals, identifying insects of livestock, knowing food and transportation laws affecting livestock. Ratings of these items were consistently higher for the instructors than for the employers.

Employer respondents were divided into six categories for the purpose of comparison. These were:

1. Seed
2. Fertilizer
3. Fertilizer-petroleum
4. Grain-feed
5. Grain-seed-feed-fertilizer
6. Any additional combinations of feed-seed-grain-fertilizer or petroleum.

As shown in Table I significant differences were obtained among the mean ratings given to the knowledges and skills by the employers in the various categories of agricultural supply businesses for 46 of the 100 items. Thus slightly over one-half of the knowledges and skills were equally essential in each of the six identified areas, identifying a core of knowledges and skills for which trainees in the agricultural supply areas identified will need equal preparation and experiences. These

knowledges and skills could provide the basis for training plans for each agricultural supply area. Keeping records of sales and figuring a balanced ration are illustrations of the items which received a uniform rating from employers representing the six areas. This uniformity is indicated by the absence of a significant difference among the average ratings given by the employer groups. An item illustrative of those which did not receive a uniform rating, as indicated by the significant levels of .05 and .01, from the employers is identifying noxious weeds. As might be predicted, employers in the seed industry rated the item as being essential, while those in the fertilizer business rated it as being nonessential.

The average rating received by each knowledge and skill from the employer groups was considered to be low (L) if the average rating was below 3.67, medium (M) if the average rating was between 3.67 to 6.33 and high (H) if the average rating was 6.33 or higher. These notations (L,M,H) are reported for each item by employer groups in Table I.

The items that received an average rating of four or greater on the nine-point scale from the three groups were subjected to Varimax factor analysis. This analysis yielded six meaningful factors (groups of items) which were named:

1. Knowledges and skills in feed, seed and fertilizer businesses.
2. Livestock industry knowledges and skills.
3. Sales and business operations in agricultural supply businesses.
4. Management of agricultural supply businesses.
5. Work habits.
6. Interacting with customers.

A knowledge or skill item was assigned to the factor for which the highest factor loading was obtained. Knowledges and skills included in these factors are grouped in Table I in descending order of the factor loadings. Thus, the first items in each factor are the most descriptive of the factor. These factors present a possible grouping of knowledges and skills that could serve as a core for units of instruction in agricultural supply courses.

Many items were related to more than one factor, hence, clear-cut factors did not emerge. Factors such as management of agricultural supply businesses appear to have more than one concept involved. These concepts are, however, related statistically in some way. Items in this factor such as advising farmers on feeds and management practices, figuring sales tax on a ticket and reading product tags and labels are clearly related to the interaction and communication of the employee with the customers. On the other hand, items such as collecting soil samples and loading and unloading supplies, are less related to customer-employee interaction. However, these activities are directly related to services provided to the customer.

Conclusions

Instructors of agricultural supply courses in Illinois junior colleges have an accurate perception of the degree to which knowledges and skills are needed in agricultural supply businesses in general. This conclusion was based on the fact that when the various types of agricultural supply employers were grouped together there were few differences among the ratings of the employers, student trainees and instructors. The researchers concluded that it is best to meet the training needs of the industry in general rather than one specific agricultural supply business, such as seed supply.

From the many differences and similarities which existed among the ratings that employers in the various types of businesses gave to the agricultural supply knowledges and skills, it may be concluded that some knowledges and skills are useful in all the types of agricultural businesses surveyed while others are useful in one or more types of businesses. Hence, the ratings of these items provide a basis for the

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development of training plans in specific types of agricultural supply businesses. The factor analysis when applied to the ratings given to the various plant diseases and skills by the employers in the various agricultural supply businesses produced meaningful clusters of items that could be used either as a grouping of instructional units or areas of a training plan to be prescribed for an individual student.

A combination of the ratings given by the various employer groups and the factors which emerged from the factor analysis provide a starting place from which teachers of agricultural supply programs may generate their own ideas for agriculture supply courses.

Table I. - Comparison of Employer Ratings of Agricultural Supply Knowledge and Skills by Type of Business Listed by Factors

Item	Factor I: Knowledge and Skills in Feed, Seed, and Fertilizer									
	Seed Fertilizer	Fertilizer	Crain- seed-gain- fertilizer	Crain- seed-feed- fertilizer	Crain- seed- fertilizer	Crain- seed- fertilizer	Crain- seed- fertilizer	Crain- seed- fertilizer	Crain- seed- fertilizer	Crain- seed- fertilizer
74. Know soil reaction principles	M	H	M	M	M	M	M	M	M	M
75. Know general principles of using barbitides	M	H	M	M	M	M	M	M	M	M
76. Know general principles of controlling plant diseases	M	H	M	M	M	M	M	M	M	M
77. Know tillage requirements	M	H	M	M	M	M	M	M	M	M
78. Know fertilizer requirements	M	H	M	M	M	M	M	M	M	M
79. Know general principles of controlling barbitides	M	H	M	M	M	M	M	M	M	M
80. Know general principles of controlling plant diseases	M	H	M	M	M	M	M	M	M	M
81. Know how to determine the quality of crops	M	H	M	M	M	M	M	M	M	M
82. Know how to determine the quality of grain	M	H	M	M	M	M	M	M	M	M
83. Know common insects of crops	M	H	M	M	M	M	M	M	M	M
84. Know sources of fertilizer	M	H	M	M	M	M	M	M	M	M
85. Making mathematical calculations	M	H	M	M	M	M	M	M	M	M
86. Know general principles of chemical insect control	M	H	M	M	M	M	M	M	M	M
87. Following directions	M	H	M	M	M	M	M	M	M	M
88. Know crop varieties	M	H	M	M	M	M	M	M	M	M
89. Know definitions of agriculture	M	H	M	M	M	M	M	M	M	M
90. Check crop yields	M	H	M	M	M	M	M	M	M	M
91. Measure grain stored in a bin	M	H	M	M	M	M	M	M	M	M
92. Demonstrate product to the customer	M	H	M	M	M	M	M	M	M	M
93. Furnish bulk fertilizer ratios	M	H	M	M	M	M	M	M	M	M
94. Provide information on chemicals, insects and diseases to customer	M	H	M	M	M	M	M	M	M	M
95. Write legibly and making distinct figures	M	H	M	M	M	M	M	M	M	M
96. Know where to find latest publications	M	H	M	M	M	M	M	M	M	M
97. Know recommendation for product use	M	H	M	M	M	M	M	M	M	M
98. Figure a balanced ration	M	H	M	M	M	M	M	M	M	M
99. Set up displays for customers	M	H	M	M	M	M	M	M	M	M
100. Fill out order blanks	M	H	M	M	M	M	M	M	M	M
101. Know how to operate a feed mill	M	H	M	M	M	M	M	M	M	M
102. Know how to determine proper time for harvesting	M	H	M	M	M	M	M	M	M	M
103. Know how to determine proper time for irrigation	M	H	M	M	M	M	M	M	M	M
104. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
105. Know how to determine proper time for fertilizing	M	H	M	M	M	M	M	M	M	M
106. Know how to determine proper time for spraying	M	H	M	M	M	M	M	M	M	M
107. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
108. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
109. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
110. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
111. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
112. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
113. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
114. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
115. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
116. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
117. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
118. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
119. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
120. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
121. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
122. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
123. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
124. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
125. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
126. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
127. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
128. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
129. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
130. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
131. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
132. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
133. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
134. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
135. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
136. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
137. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
138. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
139. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
140. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
141. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
142. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
143. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
144. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
145. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
146. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
147. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
148. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
149. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
150. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
151. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
152. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
153. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
154. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
155. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
156. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
157. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
158. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
159. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
160. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
161. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
162. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
163. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
164. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
165. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
166. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
167. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
168. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
169. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
170. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
171. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
172. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
173. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
174. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
175. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
176. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
177. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
178. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
179. Know how to determine proper time for rolling	M	H	M	M	M	M	M	M	M	M
180. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
181. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
182. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
183. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
184. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
185. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
186. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
187. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
188. Know how to determine proper time for chiseling	M	H	M	M	M	M	M	M	M	M
189. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
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191. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
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193. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
194. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
195. Know how to determine proper time for mowing	M	H	M	M	M	M	M	M	M	M
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197. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
198. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
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200. Know how to determine proper time for subsoiling	M	H	M	M	M	M	M	M	M	M
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202. Know how to determine proper time for liming	M	H	M	M	M	M	M	M	M	M
203. Know how to determine proper time for sowing	M	H	M	M	M	M	M	M	M	M
204. Know how to determine proper time for planting	M	H	M	M	M	M	M	M	M	M
205. Know how to determine proper time for weeding	M	H	M	M	M	M	M	M	M	M
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207. Know how to determine proper time for plowing	M	H	M	M	M	M	M	M	M	M
208. Know how to determine proper time for harrowing	M	H	M	M	M	M	M	M	M	M
209. Know how to determine proper time for disking	M	H	M	M	M	M	M	M	M	M
210. Know how to determine proper time for chiseling	M</									