A Questionnaire to Evaluate the Knowledge and Attitudes of Health Care Providers on Pain

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Abstract
The aims of this study were to survey the knowledge and attitudes of Italian health care professionals toward pain and develop a valid instrument to assess pain knowledge of physicians and nurses. A 21-item questionnaire on a Likert scale was given to 4,961 health professionals in 20 hospitals in Italy who volunteered to participate in the study. The results were analyzed psychometrically in three phases: the Principal Component Analysis phase identified two components, of which only the one that had 10 items about pain knowledge and attitudes (PAK) was studied; the Homogeneity Analysis revealed its acceptable internal reliability (Cronbach’s alpha = 0.72) and confirmed the Likert equidistance of the item options response; and the Confirmatory Factor Analysis proved that it had a very good construct validity. A standardized score was calculated on the PAK questionnaire using the final 10 selected items, considering 100% as the best level of knowledge of pain management and 0% as the worst. The standardized mean score on the whole sample was equal to 52.6% (95% Confidence Interval: 52.3%–53.0%). There was a statistically significant difference (P < 0.001) in percentage score between physicians (56.5%) and nurses (51.3%). Knowledge was best among physicians in Anesthesiology and Emergency; this was followed by doctors in Medicine and then surgeons. The knowledge of nurses was almost constant. This scale fills a void by providing a validated instrument for testing the general knowledge about pain treatment of hospital staff. It is brief and can easily be administered to a considerable number of people. [1]

Key Words
Knowledge on pain, pain attitudes, questionnaire, scoring system, rating scale

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Introduction

In recent years, there has been a growing awareness among health care professionals, and the public in general, concerning the importance of guaranteeing effective pain management for patients. It is well known that pain may adversely affect quality of life, and indeed, the development of illness itself. Although the means to control pain is available for the majority of cases, the prevalence of pain in health institutions and the community is still high.1–5 Therefore, in many cases, pain is both unnecessary and avoidable.

The reasons for this may lie in the scant interest and attention of health professionals regarding pain and the lack of familiarity with the drugs and methods that are usually effective in controlling pain. In an attempt to assess this assumption, there have been numerous studies dealing with the trainings of health care professionals and their attitudes toward patients in pain. To varying degrees, professionals have been found to lack knowledge and the correct attitude toward pain.6–10

To our knowledge, four studies have been published regarding pain knowledge in Italy. One study was carried out on a small number of physicians, mostly anesthesiologists,11 another involved a broader group of general practitioners;12 and a third assessed a very selected group of medical oncology residents.13 Only one of the studies refers to the entire medical staff (physicians and nursing staff in all departments) in one medium-sized hospital.9 A variety of questionnaires have been used to test pain management knowledge in these and other studies. Many of these questionnaires are primarily concerned with attitudes of health professionals toward the use of opioids,14–16 some with the effects of courses in palliative care,17 and some with the evaluation of nursing students’ pain knowledge.18 Most of them dealt with nursing experience.

Therefore, the aims of this study were the following: 1) to present data on the knowledge of and the attitude toward pain in a wide sample of hospitals throughout Italy, including both doctors and nurses; and 2) to develop a reliable and valid instrument to assess the knowledge of pain of health professionals by checking the dimensionality of the set of items and calculating a score to grade the subjects according to their level of knowledge.

Methods

Sample

This survey was cross-sectional and was carried out in October 2000 in 20 hospitals. In total, 4,961 health care professionals volunteered to take part in the study. They were located in different regions of Italy: 10 in the northern part, seven in the central part, and three in the southern part of the country. The hospitals were small or medium sized and all of them were public except one that was a private clinic. The health care professionals (1,348 physicians, 3,457 nurses, and 156 not specified) were also divided according to the hospital department where they worked: 2,363 in Medicine, 1,931 in Surgery, 575 in Anesthesiology and Emergency, and 90 in other departments that could not be precisely classified; two had missing data. Anesthesiology and Emergency were combined because in Italy, the medical staff working in these wards have undergone their training in the same Specialization School of Anesthesiology and Intensive Care. A distinction was also made according to the geographical position of the hospital: northern (2,499 subjects), central (1,880), and southern Italy (582).

Initial Questionnaire

The initial questionnaire comprised 21 items in Italian, and the interviewees were asked to reply according to five-point Likert scales ranging from “strongly agree” to “strongly disagree.” The questionnaire was anonymous. Answers were assessed on the basis of the degree to which they matched the criteria of pain therapy commonly recognized by the international medical community. The response “neither agree nor disagree” was considered separately. The choice of the items was inspired by the survey of Lebovits et al., and by a pilot survey carried out by some of the authors in one hospital in Italy.6,9 The questionnaire used in the Lebovits et al. study6 was not analyzed psychometrically. Of the 21 items in our survey reported in Table 1, 16 were translated into Italian from the Lebovits
et al. study\textsuperscript{6} (questions 1, 2, 4–10, 15–21), and five were prepared by the authors (questions 3, 11–14).

The questionnaire was handed to the head nurse of each hospital ward, who undertook to give it to all the doctors and nurses in the ward; all were instructed to keep the questionnaire anonymous but to indicate their qualifications and the name of the ward. The questionnaire was to be completed quickly, without consulting medical texts.

**Psychometric Analysis**

In developing a scale from the initial questionnaire, we considered one sequence of exploratory and confirmatory analysis in three phases.

**Table 1** Percentage of Correct Answers, Percentage of “Neither Agree Nor Disagree” Answers, and Missing Data of the Initial 21-Item Questionnaire

<table>
<thead>
<tr>
<th>Items in the Questionnaire</th>
<th>Percentage of Correct Answers (95% CI)</th>
<th>Percentage of “Neither Agree Nor Disagree” Answers</th>
<th>Percentage of Missing Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Giving narcotics on a regular schedule is preferred over “p.r.n.” schedule for continuous pain. (a)</td>
<td>81.1 (80.0–82.2)</td>
<td>7.9</td>
<td>0.3</td>
</tr>
<tr>
<td>2. A patient should experience discomfort prior to giving the next dose of pain meds. (d)</td>
<td>45.2 (43.9–46.6)</td>
<td>15.4</td>
<td>0.8</td>
</tr>
<tr>
<td>3. The preferred rule of administration of narcotic pain relievers to patients with pain is intramuscular. (d)</td>
<td>55.8 (54.4–57.1)</td>
<td>25.1</td>
<td>1.4</td>
</tr>
<tr>
<td>4. When a patient requests increasing amounts of analgesics to control pain, this usually indicates that the patient is psychologically dependent. (d)</td>
<td>37.8 (36.4–39.1)</td>
<td>35.1</td>
<td>1.4</td>
</tr>
<tr>
<td>5. Patients receiving narcotics on a “p.r.n.” basis may be likely to develop clock-watching behaviors. (a)</td>
<td>40.0 (38.6–41.3)</td>
<td>21.8</td>
<td>1.0</td>
</tr>
<tr>
<td>6. The most accurate judge of the intensity of the patient’s pain is the patient. (a)</td>
<td>64.1 (62.8–65.4)</td>
<td>22.0</td>
<td>0.7</td>
</tr>
<tr>
<td>7. When a patient in pain is receiving analgesic medication on a “p.r.n.” basis, it is appropriate for the patient to request pain meds before the pain returns. (a)</td>
<td>39.5 (38.2–40.9)</td>
<td>20.6</td>
<td>1.0</td>
</tr>
<tr>
<td>8. Staff can always pick up cues from children that indicate that they are in pain. (d)</td>
<td>46.4 (45.0–47.8)</td>
<td>28.6</td>
<td>1.3</td>
</tr>
<tr>
<td>9. Because narcotics can cause respiratory depression, they should not be used in pediatric patients. (d)</td>
<td>37.2 (35.8–38.5)</td>
<td>32.7</td>
<td>2.2</td>
</tr>
<tr>
<td>10. Children cry all the time, therefore, diversional activities are indicated rather than actual pain meds. (d)</td>
<td>45.5 (44.1–46.9)</td>
<td>29.1</td>
<td>1.1</td>
</tr>
<tr>
<td>11. The most suitable dose of morphine for a patient in pain is a dose that best controls the symptoms; there is no maximum dose (i.e., a level that must not be exceeded) for morphine. (a)</td>
<td>45.0 (43.6–46.4)</td>
<td>18.9</td>
<td>3.5</td>
</tr>
<tr>
<td>12. It may often be useful to give a placebo to a patient in pain to assess if he is genuinely in pain. (d)</td>
<td>24.3 (23.1–25.5)</td>
<td>14.7</td>
<td>2.7</td>
</tr>
<tr>
<td>13. For effective treatment of cancer pain it is necessary to continuously assess the pain and the efficacy of the therapy. (a)</td>
<td>91.2 (90.4–92.0)</td>
<td>3.0</td>
<td>2.5</td>
</tr>
<tr>
<td>14. It is a patient’s right to expect total pain relief as a consequence of treatment. (a)</td>
<td>70.9 (69.6–72.1)</td>
<td>14.9</td>
<td>2.8</td>
</tr>
<tr>
<td>15. Lack of pain expression does not mean lack of pain. (a)</td>
<td>83.5 (82.5–84.5)</td>
<td>7.3</td>
<td>2.6</td>
</tr>
<tr>
<td>16. Distraction, for example, by the use of music or relaxation, can decrease the perception of pain. (a)</td>
<td>67.4 (66.1–68.7)</td>
<td>20.0</td>
<td>2.6</td>
</tr>
<tr>
<td>17. Estimation of pain by an M.D. or R.N. is as valid a measure of pain as a patient’s self-report. (d)</td>
<td>46.2 (44.8–47.6)</td>
<td>28.5</td>
<td>3.1</td>
</tr>
<tr>
<td>18. Patients having severe chronic pain often need higher dosages of pain meds than patients with acute pain. (a)</td>
<td>46.6 (45.2–48.0)</td>
<td>24.5</td>
<td>3.4</td>
</tr>
<tr>
<td>19. Increasing analgesic requirements are signs that the patient is becoming addicted to the narcotic. (d)</td>
<td>25.0 (23.7–26.1)</td>
<td>34.7</td>
<td>2.7</td>
</tr>
<tr>
<td>20. If a patient (and/or family member) reports that a narcotic is causing euphoria, s/he should be given a lower dose of the analgesic. (d)</td>
<td>31.3 (30.0–32.6)</td>
<td>35.7</td>
<td>3.5</td>
</tr>
<tr>
<td>21. 25% of patients receiving narcotics around the clock become addicted. (d)</td>
<td>30.2 (28.9–31.4)</td>
<td>35.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>50.2 (49.7–50.7)</td>
<td>22.7</td>
<td>2.0</td>
</tr>
</tbody>
</table>

(a) = Correct answer: “agree” or “strongly agree.”
(d) = Correct answer: “disagree” or “strongly disagree.”
p.r.n. = Pro re nata
Principal Component Analysis Phase. To identify the number of the underlying components of the initial questionnaire, the Pearson’s correlation matrix was explored by means of Principal Component Analysis (PCA);\(^{19}\) items weakly correlated with others \((r < 0.15)\) had been previously excluded from this analysis. The number of components was determined on the basis of eigenvalues of the correlation matrix greater than 1, and by looking for sharp breaks in the size of the eigenvalues using a scree plot. Varimax rotation and item-component correlations, i.e., “component loading,” greater than 0.32, in absolute value, were chosen to identify a simple component structure.

Multiple Correspondence Analysis Phase. Multiple Correspondence Analysis (MCA) or Homogeneity Analysis (HOMALS)\(^{20}\) is designed to test the items’ internal homogeneity and reliability and the Likert equidistance of the item option responses for each dimension of the PCA. This method uses the Likert points as nominal categories responses and enables optimal grading for each category response of the Likert questions (called “optimal weights”); consequently, an “optimal score” for each subject could be obtained. The optimal score of a subject is the sum of the optimal weights of the item options chosen. According to the criterion of the internal consistency, MCA computes a homogeneity index (called “Guttman’s eta”), and the “optimal reliability” determined by Cronbach’s alpha coefficient is a one-to-one transformation of Guttman’s eta. Good internal consistency has been suggested if Cronbach’s alpha exceeds 0.70, and good homogeneity has been suggested if Guttman’s eta value exceeds 0.30. The assumed equidistance across Likert points is checked by plotting the optimal weights vs. Likert points (called “transformation plot”); we should expect a straight-line plot for each item if equidistance is a correct assumption.

Confirmatory Factor Analysis Phase. A Confirmatory Factor Analysis (CFA)\(^{19}\) model with one factor is fitted, considering Likert or optimal points of the item option responses set for each dimension of PCA. The construct validity of the assumed unidimensionality is evaluated from the CFA model fitting solution by the Standardized Root Mean Squared Residual (SRMR) index; this measures the residual reduction of the model (mis)fit as one factor is added to the null model of uncorrelated items. Unidimensionality is suggested if SRMR index is less than roughly 0.05. Item-factor correlations, i.e., “factor loading,” and McDonald’s omega reliability\(^{21}\) are also computed. Correlations >0.32 in absolute value and omega >0.70 are the chosen cut offs to corroborate unidimensionality.

New Questionnaire

Once the new questionnaire had been designed, results according to the new version were computed considering both the correct/incorrect modality and the score of answers. In the latter case, missing data referring to any single item were assigned the value of the median of all the subjects, and a standardized score was calculated as summed score/maximum score, expressed as a percentage, with 100% indicating the most favorable level of “knowledge and attitudes toward the approach and treatment of pain” and 0% the least favorable. Differences in scores between professional categories (physicians and nurses), hospital departments (Anesthesiology and Emergency, Medicine, Surgery, and other departments), and geographical zones (northern, central, and southern Italy) were tested through ANOVA. Descriptive data analyses and PCA/MCA were performed using SPSS software, version 13.0 (http://www.spss.com), and CFA was provided by Mplus software, version 3.13 (http://www.statmodel.com).

Results

Correct Answer Distribution of the Initial Questionnaire

The overall percentage of correct answers of the 4,961 caregivers who completed the initial questionnaire was 50.2% (95% Confidence Interval [CI]: 49.7%–50.7%), corresponding to an average number of correct answers of 10.5/21 (Table 1). The question with the highest percentage of correct answers (91.2%) was q13 (“For effective treatment of cancer pain, it is necessary to continuously assess the pain and the efficacy of the therapy” [the correct answer is “agree”]). The question with the lowest
number of correct answers was q12 ("It may often be useful to give a placebo to a patient in pain to assess if he is genuinely in pain" [the correct answer is "disagree"]). In Table 1, the percentage of missing answers is also shown: it tends to be higher from q11 onward, because the questions were written on the back of each page of the questionnaire and perhaps some interviewees did not see them.

There was a statistically significant difference ($P < 0.001$) in the number of correct answers between doctors (12/21; 57.3%) and nurses (10/21; 47.6%). There were also statistically significant differences ($P > 0.001$) between Anesthesiology and Emergency (11.6/21; 55.2%), with the highest mean score, and other departments (10.6/21; 50.5%), Medicine (10.5/21; 50.2%), and Surgery (10.2/21; 48.7%). The highest percentage of correct answers was reached in central Italy (11.0/21; 52.1%), followed by southern Italy (10.5/21; 50.1%) and northern Italy (10.2/21; 48.7%). These differences were again statistically significant ($P < 0.001$). Questions 4, 9, 19, 20, and 21 present the highest percentage of "neither agree nor disagree" answers.

**Psychometric Analysis**

Considering the correlation matrix between the items of the initial questionnaire, seven questions (q5, q6, q7, q11, q14, and q18) were excluded from the PCA as they were weakly correlated ($r < 0.15$) with the vast majority of the other items. As q19 was almost equal to q4 ($r = 0.44$), it was also excluded.

PCA identified two dominant components (eigenvalues $> 1$), explaining 33% of the total variance and 60% of the pairwise correlations of the 14 questions examined. Component loading patterns, after Varimax orthogonal rotation of the correlation matrix, are shown in Table 2. The first component includes 10 items about "the knowledge and attitudes toward pain of the health care providers"; the second component includes four items containing questions with a high percentage of correct answers that are not particularly useful for the identification of a valuable dimension, and therefore, has not been considered in the following MCA/CFA phases. These results are the same as those obtained when doctors’ and nurses’ data were analyzed separately.

The internal criterion index (Guttman’s eta) of the MCA scaling was equal to 0.285, and the Cronbach’s alpha coefficient was 0.722, indicating an “acceptable” optimal scaling.

The MCA optimal weights are reported in Table 3 and displayed in Fig. 1. The transformation plot of the optimal weights shows that all of the items describe a straight line (are in a linear form), and therefore, the Likert equidistance assumption was respected. Thus, the original Likert points from 1 to 5 were retained for the 10 selected items, and in the CFA phase the items were processed as continuous variables. McDonald’s omega index was equal to 0.708, indicating an acceptable reliability, and the SRMR index was equal to 0.03, i.e., the assumption of conditional items independence given the unidimensional instrument was supported.

Raw item-total score correlations varied from 0.61 (q4) to 0.40 (q17) (Table 4). The same trend was found for the optimal item-total score correlations (from 0.65 of q4 to 0.36 of q17), and it was similar for item-factor correlations (from 0.58 of q10 to 0.23 of q17). This suggests that the sum row scores or the sum optimal scores were good values of the “true” scores of the continuous unidimensional factor underlying the 10-item set called “pain knowledge and attitudes” (PAK) that health care providers might have toward patients.
#### Description of the PAK Scale Scores

The mean number of correct answers for the selected 10 items of the PAK scale was 4.0/10 (40%; CI: 39.3%-40.6%); physicians had 47.7% of correct answers and nurses 37.2% ($P$ < 0.001). Anesthesiology and Emergency scored 46.9%, followed by other departments with 42.1%, Medicine 39.8%, and Surgery 38.0% ($P$ < 0.001).

When considering the PAK questionnaire on the standard scale from 0 (least favorable attitude) to 100 (most favorable attitude), the standardized mean score (Table 5) calculated on the whole sample was equal to 52.6% (CI: 52.3%-53.0%). The difference between the percentage score of physicians (56.5%) and nurses (51.3%) was statistically significant ($P$ < 0.001), as was the difference between Anesthesiology and Emergency (56.1%, the highest percentage), and other departments (54.8%), Medicine (52.6%), and Surgery (51.6%; $P$ < 0.001). Significant differences also were observed among northern, central (the highest percentage), and southern Italy (the lowest). A significant interaction ($P$ < 0.001) between hospital departments and professional staff was found (Table 5): There was a decrease in knowledge between physicians in Anesthesiology and Emergency, followed by doctors in Medicine and then physicians in Surgery, whereas the knowledge of nurses remained almost constant.

#### Discussion

This study provides an overview of the professional preparation and attitudes of physicians and nursing staff in Italy with regard to pain. Moreover, through the data collected, a reliable and valid instrument to assess the pain knowledge of health professionals has
been developed. Participation in the study was on a voluntary basis. However, we believe that the high number of participants and the location of the hospitals in different regions of the country make the results representative of the Italian situation. Furthermore, newly collected data from other hospitals in Italy (Zanolin, data not published), obtained by using the same initial questionnaire, seem to be very similar to the findings presented here. This confirms that the findings of this study can be generalized to fit most hospital health professionals working in Italy.

**The Initial Questionnaire**

The overall percentage of correct answers was 51.2%. This does not greatly differ from the results published by Lebovits et al., who conducted a study in three New York City hospitals using a 15-item questionnaire that was very similar to ours. Out of 686 nurses, physicians, pharmacists, and medical and nursing students, 56% correct answers were obtained.

In a previous study, the authors found 61% correct answers in one single hospital in Italy, although they are slightly lower. On one hand, they seem to indicate that there is considerable awareness toward a patient in pain, but on the other hand, there is an important lack of preparative training in the case of pharmacological treatment.

In the present study, there was a statistically significant difference between percentages of correct answers of the different professional groups (physicians 58.1% vs. nurses 48.7%). This difference was also noticed by Lebovits et al. and Visentin et al. and could be due to the lack of adequate training programs for nurses. The difference in answers between professionals working in different specialist fields also was significant from a statistical point of view: Correct answers were more frequent among staff from intensive care departments and medical wards compared to surgical departments (similar findings were reported by Lebovits et al. and Visentin et al.).

The percentage of correct answers was significantly higher in central Italy with respect to hospital locations.
to those obtained in the north and the south, which was probably due to the presence of a higher number of small-sized hospitals taking part in the survey. In these kinds of hospitals, the staff is usually less stressed by other commitments and can dedicate more time to pain management, which is not usually considered a priority. Moreover, sensitization to pain can easily reach a greater percentage of the hospital staff in smaller environments. The lower percentage of correct responses in the south of Italy is not surprising, as hospitals in that part of the country are not commonly considered at the same level as the rest of the country. Nevertheless, the total overall percentage of correct answers was low, revealing the necessity to implement training courses specifically for the fields suggested by the questions with the worst response rates.

**Psychometric Analysis**

During the psychometric analysis, some questions were excluded, as they were weakly correlated with the others, and q19, which was very similar to q4, was not included. The PCA output revealed that the initial questionnaire was not unidimensional, but it was made up of two components. Only the first one, “knowledge and attitudes toward the treatment of pain,” accounting for the greatest explained total variance/pairwise correlations, was considered in the MCA/CFA scaling assessment. Another reason for excluding the second component was that it only contained four questions with a high percentage of correct answers, and so it was not very useful for the aim of our study.

A relatively good internal homogeneity was found for this set of 10 items after MCA scaling, as Guttman’s eta was equal to 0.285, which is close to the 0.30 value that is considered the cut off for good homogeneity. Cronbach’s alpha coefficient was 0.72, denoting a good reliability, as it exceeded the value of 0.70 and indicated a low degree of error in measuring the characteristic of interest. As far as the internal homogeneity is concerned, most items were referred either to the medical knowledge of analgesic use (q2, q3, q9, and q12) or to prejudice about presumed misuse (q4, q10, q20, and q21), whereas q8 and q17 dealt with pain assessment of health professionals with respect to patient perception, which could perhaps lead to a decrease in homogeneity.

Questions 8 and 17 are less correlated to the total score than the other items (Table 3), which is probably due to the fact that these two questions are slightly different from the others, confirming their contribution to the decrease in homogeneity. The MCA method also makes it possible to test the equidistance across the Likert points within each question. This was confirmed for all of the items, revealing that there was no necessity to use optimal scaling scores.

Finally, through CFA we could evaluate construct validity: The SRMR index was less than 0.05, indicating that all of the items are linked to a unique underlying factor (dimension), and, therefore, this scale presents very good construct validity. McDonald’s omega confirms the acceptable reliability of the reduced questionnaire (PAK).

The question with the best item-total and optimal scoring-total correlation was q4, followed by q10, which was the best for item-factor correlation. On the contrary, as already mentioned, the questions presenting a lower item-total correlation were q17 and q8, probably due to the slightly different content orientation.

**The PAK Scale Scores**

The mean number of correct answers of the 10-item PAK questionnaire was 10% lower with respect to the initial questionnaire, because most of the items with the highest percentage of correct response had not been selected for the final version. This is an important characteristic because questions having an excessively high percentage of correct answers do not discriminate subjects with a good knowledge in respect to the others. The other differences between the categories of professional staff or among hospital departments gave the same results as those obtained from the initial questionnaire.

The standardized score was higher than the correct answer percentage of the initial questionnaire, because it also assigned a score to the “neither agree nor disagree” answers. The trend of the score differed according to physicians (gradually increasing from Surgery to Anesthesiology and Emergency) and nurses (almost constant across hospital departments) in different hospital departments, and the explanation for this could be that there is no
specialization in different medical disciplines for nurses in Italy at present. Consequently, nurses have all undergone the same professional training in pain management, regardless of the ward they work in. On the contrary, physicians have different professional backgrounds, based on their specialization, which may comprise training in pain management (e.g., anesthesiologists) or not (e.g., surgeons). Moreover, surgeons usually develop their technical abilities to a higher level and instead delegate the control of postoperative pain to anesthesiologists.

The proposed PAK scale in this survey fills a void in the validated instruments in the field of testing the general knowledge about pain treatment of hospital staff. It is brief and can easily be administered to a considerable number of people. Another advantage is the simple way in which the PAK questionnaire quantifies adherence to scientific criteria concerning pain knowledge on a scale from 0 (0% standard score; the least favorable level of knowledge and attitude) to 40 (100% standard score; the most favorable level of knowledge and attitude). Nevertheless, the PAK does not assess other important aspects of pain management that are more linked to clinical practice, such as the compliance or the motivation in approaching the problem of pain in a hospital setting. Hopefully, other surveys will be implemented to study in depth these important elements.

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