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# Editor's Report

I am pleased to bring to you the 2024/2025 Issue of *Journal of Risk Education (JRE)*.

I am in search of three additional Associate Editors. If you are interested, please e-mail me at editor@jofriskeducation.org, and, please put "Associate Editor" in the subject line of your email. Doctoral students are most welcome to apply. Thanks in advance.

Please continue to send us your papers for consideration. If you have questions, don't hesitate to ask them.

Sincerely,

Brenda Wells, Ph.D., CPCU, AAI, CRIS, CICS

Editor
Robert F. Bird Distinguished Professor of Risk and Insurance
East Carolina University

# Call for Papers

The *Journal of Risk Education (JRE)* requests submissions of articles and other materials for its 2026 issue.

Submissions should be formatted as follows for ease of publication:

1. Please single space all text, and indent the first line of each paragraph.

2. Use footnotes (no endnotes).

3. Do not include headers, footers or page numbers.

4. Use an 11 point font for all text, and please use font "Californian FB." Use **only** that font throughout the paper. Please don't mix different fonts together!

5. Include at the top of your paper the title in all bold print. Do NOT put author names in the file or in the file name. Capitalize the first letter of each word in the title.

6. Put all major section headings in all capital letters and bold print, centered in the middle of the page. Subheadings should be in bold print, aligned with the left margin of the page, and only the first letter of each word should be capitalized. Do not enumerate sections or subsections.

7. Do NOT use MS Word's section headings--headings and subheadings should be in plain text only.

8. Position all figures and tables exactly where they should appear in the text, rather than attaching them at the end of the document. This journal does not have a professional graphic designer to make your tables fit; it is your responsibility to put tables, exhibits, etc **exactly** where you want them.

9. Title your bibliography section in all capital letters and in bold print, as REFERENCES.

10. Format all references to have a hanging indent, and single spaced. Leave one blank line space between each reference. Make certain references are alphabetized correctly. Do not number references.

11. Put one blank line space in between each paragraph.

**To submit an article for consideration, please create an account on our website at www.jofriskeducation.org and follow our electronic submission process. All papers must be submitted using the website. We are unable to accept e-mail submissions.**

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**Dr. Brenda Wells, CPCU, AAI, CRIS, CICS, Editor**

**East Carolina University – editor@jofriskeducation.org**

# Insurance Company Analysis Project

**Michael J. McNamara**
**Washington State University**

## ABSTRACT

A time-tested insurance company analysis project applicable to several risk management and insurance courses is described. The project can augment material covered in a life insurance course, a property and liability insurance course, a risk management course, and an insurance company operations course. The project is flexible and can be modified to stress concepts the instructor wishes to cover with their students. The project introduces students to insurance company accounting and financial statements, organizational structure, regulation, profitability measures, and other concepts. A side benefit of the project is introducing students to a primary data source that may be of assistance in their job search process. The project can be assigned individually or as a group project.

## INTRODUCTION

Project-based learning has been around for many years. Early proponents (e.g. Dewey), advocated pedagogy in which students take an active role in the learning process. Contrasted with the passive "mug and jug" approach[10], active learning requires students to do more than simply watch, listen, and take notes during a classroom session. The challenge for university risk management and insurance instructors may be finding and/or developing such pedagogy that can be used in their classes.

The purpose of this paper is to introduce and discuss an active learning project that can be applied to several upper-level risk management and insurance university courses. The paper is organized as follows. The next section provides a quick overview of recent developments in attempts to help share risk management and insurance classroom projects and cases, including discussion of some of the innovative ideas. The following section provides some background on the development and use of the project presented in this paper. The next section discusses some major topics that can be examined in the project. A summary and conclusions are offered in the final section. A sample project appears in the appendix and is available from the author in an MS Word file upon request.

[10] This view asserts that a professor is a "jug" filled with knowledge and a student is a passive "mug" to be filled with the knowledge the professor shares.

## DEVELOPING AND SHARING RISK MANAGEMENT AND INSURANCE

## CASES, ASSIGNMENTS, AND PROJECTS

University professors interested in risk and insurance have several venues to share their research findings with colleagues. National conferences, such as the American Risk and Insurance Association (ARIA) meeting, and regional conferences (e.g. the Southern Risk and Insurance Association (SRIA) meeting and the Western Risk and Insurance Association (WRIA) meeting) provide excellent opportunities. Scholarly journals publish theoretical and empirical risk management and insurance research. In addition to conducting research, teaching is also an important activity for professors in our field. Up until relatively recently, little emphasis was placed on the exchange of innovative teaching cases and tools.

In 1991, ARIA began to offer the Les Strickler Innovation in Instruction Award, named for a long-time professor at Oregon State University. The award honors innovative excellence in risk management and insurance instruction. The award winner makes a presentation at the ARIA meeting and a write-up of the project/case/innovation is published in an ARIA journal. In 2004, The *Journal of Risk Education* was launched. This journal provides another outlet for sharing ideas about risk management and insurance instruction. Recently, ARIA created the "Risk & Insurance Teaching Society" to support the development of RMI programs and advance pedagogy in our field.

A number of interesting projects, cases, and assignments have been shared because of these efforts.[11] Baranoff (2001) described a game used in an introductory insurance class. Balls representing different types of risk (e.g. premature death and the liability risk) are shared with students who can transfer the risk to an insurer. The game introduces students to a number of concepts, including underwriting, risk bearing, pooling, and the insurance mechanism. Using the analogy of a student's grade as an intangible asset that can be protected, Pope and Ma (2004) presented a project through which students develop and market a "grade insurance" product. The project requires a written strategy proposal, a marketing element, and an end-of-semester marketing session where teams try to "sell" their grade insurance product to their classmates. The project exposes students to the role of insurers as coverage providers that assist consumers seeking to mitigate their risk.

Several other assignments/projects targeted at the introductory risk management and insurance course merit discussion. Gatzlaff (2013) provides three practical assignments that can be used to address pure loss exposures in an introductory class. The first assignment addresses property and liability insurance risks and tasks students with obtaining an auto insurance quote assuming different bodily injury liability coverage limits and physical damage deductibles. In the second assignment, students obtain quotes for term life insurance for applicants in different rating categories. The third assignment addresses the longevity risk and requires students to analyze retirement needs and how to accumulate funds to address the risk through a life annuity. Avila and Gatzlaff (2013) discuss three assignments that could be used to examine speculative risks if this topic is covered in greater detail in an introductory class.

Kerr and Avila (2013) present a simulation game requiring students to make a number of decisions regarding the personal risks they face. Athavale and Avila (2020/2021) describe an assignment introducing students to the life insurance application process, types and characteristics of three types of life insurance, and life insurance cost analysis. Epermanis and Wood (2020/2021) provide a teaching case addressing personal and small business risk, and the risk treatment measures available to address these loss exposures.

Projects and assignments may also be designed for higher-level risk management and insurance courses. Lei (2017), for example, describes an Excel-based project applicable to a life insurance course. Students use Excel as a tool to assist with determining additional life insurance needs. Miller and Sommer (2018) provide a risk financing simulation exercise, starting with a single "siloed" risk and then expanding the scope to consider all the risks faced on an enterprise-

[11] The articles cited are not intended to be an exhaustive list, but rather to provide some examples of innovative cases, projects, and assignments, that have appeared in the literature.

wide level. Harrington (2022/2023) showed how statistical and financial analysis could be applied when evaluating insurance renewal coverage options during a hard insurance market.

## DEVELOPMENT AND USE OF THE INSURANCE COMPANY ANALYSIS PROJECT

A desire to supplement the information covered in my upper-level risk management and insurance classes, to place less emphasis on quizzes and exams, and to promote active learning led to the development of the "Insurance Company Analysis Project." The project has been used for over 30 years in classes at three different universities. The project provides coverage of key concepts relating to insurance companies, including insurer financial statements, profitability measures and ratios, underwriting leverage, organizational structure, statutory accounting, reinsurance, and other topics. The project is flexible, permitting an instructor to stress concepts that she or he wishes to emphasize.

Developing classroom projects can be challenging. Care must be taken to make projects relevant and not "make-work" for students. Projects can supplement the material regularly covered in class and/or reinforce regular course content. My life insurance and financial planning course traditionally covered life insurance purchase motivations, how much life insurance to purchase, types of life insurance and annuities, contractual provisions, and ratemaking. My risk management course covers the risk management process and applications of financial analysis to risk management. A property and liability insurance course is often taught as a contracts course. An insurance company operations course may cover the functional areas (underwriting, claims, sales, ratemaking, etc.) in detail. What may be missing from these courses is an understanding of the organizations to which the risks are transferred: insurance companies.

The "Insurance Company Analysis Project" supplements material covered in my upper-level classes. The project has been used in a life insurance course and in a risk management course. It would be easily applicable to a property and liability insurance course and to an insurance company operations course. The project requires students to access a database with information about insurance companies and to answer a set of questions about an insurer. While the project has been assigned on an individual basis, it could also be used as a group project.

To use this project, students must have access to data on insurance companies. Over the years, *Best's Insurance Reports* has served as my source. In the early years of assigning the project, students would submit a photocopy of the *Best's Insurance Reports* exhibit for the company analyzed along with their answers to a set of questions. The exhibit was obtained from the famous large green (property and liability insurance companies) or maroon (life and health insurance companies) books. Eventually, A.M. Best also put their data on a CD-Rom that was periodically updated during the year. Students could download the company exhibit from the CD-Rom, print it, and submit it along with their answers. Currently, A.M. Best offers company exhibits on a database through a subscription. My students access the database through the university library web site and print the exhibit for the company they are analyzing.

Several approaches have been used for students to select a company to analyze. One semester, students were permitted to choose a company on their own. That approach was problematic, as some smaller companies were selected that did not provide complete data. During the COVID-shutdown, when students took the courses remotely via Zoom, companies were assigned to the students. A happy medium is pre-selecting a set of companies for which the necessary data are available, and letting students select an insurer to analyze from this set of companies. I provide the name of the insurance company, where the company is located, and the company's A.M. Best Number. This approach guarantees that the company will be included in the database and have the information needed to complete the project. It also reduces

confusion about which company to analyze. It is easy for students to search the database using the A.M. Best Number to find the company they selected.[12]

After students select a company to analyze, the project is distributed in class. Previously, I distributed a sample company exhibit from Best's to use while going over the project with the students. With improved classroom technology, I access the AM Best database through a classroom computer and project a company exhibit on a large screen. There are usually 16 to 18 questions on the project, with the questions addressing various information provided in the exhibit. While each student receives the same set of questions to answer, each student applies the questions to a different insurer when they complete the project. Students are asked to submit a printout of the company exhibit along with their answers. Students are given several weeks to complete the project.

When assigning the project, two important caveats about the company exhibits are shared with the students. First, to conserve space, A.M. Best reports most dollar value in thousands with a "(000)" notation. For example, total assets reported as $670,530 are really $670,530,000. Second, as the database is periodically updated during the year, A.M. Best reports some partial-year (e.g. 6-month or 9-month) values for some entries. While partial-year values are the most up-to-date information available, I ask students to use values for the end of the last full calendar year reported. Partial-year balance sheet values might be acceptable, but partial-year income statement values are problematic. For example, if asked to calculate a return on assets, it would not make sense to use six months of net income divided by total assets. Nor would it make sense to use nine months of premium income when considering the net premiums written to surplus ratio. Using year-end values to answer the questions solves such problems.

The question set can be tailored to the class and to the concepts the instructor wishes to cover. For example, when the project is used in a life insurance course, a life insurance company is analyzed and the accounting treatment of life insurance policy loans can be addressed, as well as the origin and purpose of a life insurance company's "separate account." When a property and liability company is analyzed in a risk management class, the volatility of property and liability insurance markets (hard vs. soft) can be discussed as well as fluctuating underwriting profitability as measured by the combined ratio. The importance of investment income can be demonstrated by showing how a net underwriting loss can be offset by investment income. The accounting treatment of premiums -- written vs. earned -- and expense recognition under statutory accounting can motivate discussion of proportional reinsurance (e.g. quota share) for surplus relief.

Going over the project with the students when the project is assigned is one of my favorite class meetings each semester. There is no class period, in my view, where greater learning takes place. Many of the concepts are new to students who are not familiar with insurance companies, the industry, insurer financial statements, important insurer ratios, and the other topics. Many "new" concepts are introduced, and students learn about a primary source of data for the industry, *Best's Insurance Reports*.

## MAJOR TOPICS COVERED IN THE PROJECT

An instructor is free to cover a variety of topics in the project. For the purposes of this write-up, the major topics are grouped into these categories: statutory accounting and financial statements, organizational structure and regulation, profitability measures and financial ratios, and other areas. A sample project is included in the appendix, and the author will provide an MS Word version of the project to anyone upon request.

[12] When searching for a company by name, the precise name of the company must be used. A company may also be part of a holding company or group of companies with a similar name. Searching by the six- digit AM Best Number assures that the desired company is accessed.

**Statutory Accounting and Financial Statements**

Most college of business students will take one or two semesters of accounting as part of the business core curriculum. Accounting courses teach generally accepted accounting principles (GAAP), as they apply to non-financial organizations, such as manufacturing companies. Such businesses have plant and equipment, inventory, goods in process, accounts payable for raw materials, and similar accounting entries. Insurance regulators, however, require financial statements to be prepared using statutory accounting. AM Best reports values from these statutory financial statements.

The Balance Sheet The balance sheet may appear foreign to students as the bulk of insurance company assets consists of financial assets (e.g. bonds, stocks, and mortgage-backed securities) vs. physical assets (plant, equipment, and inventory). The balance sheet provides a great opportunity to discuss statutory accounting versus GAAP accounting. The conservative nature of statutory accounting can be discussed in relation to the treatment of bond valuation and the prescribed method of valuing other assets. Asset accounts unique to insurers, such as life insurance policy loans and the separate account, can also be highlighted. The difference between "admitted" and "nonadmitted" assets can also be discussed.

On the liability side, unique aspects of insurance company operations can be stressed. A manufacturing company, for example, knows exactly how much it owes for raw materials. A company that has borrowed money knows how much it must repay. Ultimate insurance company liabilities, however, are unknown in advance. The best an insurance company can do is estimate the cost of current and future claims; and the loss adjustment expenses associated with these claims. These estimates, loss reserves, are usually the largest liabilities. Discussion of another important liability, the unearned premium reserve, provides another opportunity to stress the conservative nature of statutory accounting.

When introducing the final section of the balance sheet, surplus and capital, students are reminded of the balance sheet equation: assets equal liabilities plus capital (or owner's equity). The components and sources of paid-in capital and surplus for an insurer are discussed, as well as how surplus can be built over time. The presence of "paid-in capital" provides a natural opportunity to discuss organizational structure, stock companies versus mutual companies. The ability of stock companies to raise additional capital compared to mutuals is noted. The importance of surplus, when liabilities can only be estimated, is also highlighted.

The Income Statement Several questions on the project deal with the income statement. Students are usually familiar with premiums as a major source of income for insurers. Premiums written vs. premiums earned under statutory accounting may be discussed. The importance of investment income as a second source of income is stressed. Having just examined the assets section of the balance sheet, students can see that the stocks and bonds held as assets provide investment income to insurers. The impact of low and high interest rates and the implications for investment income may be covered.

On the expense side, losses and loss adjustment expenses, underwriting expenses, and general insurer expenses are discussed. The discussion provides a good opportunity to discuss insurer expenses relative to premium income and the expense ratio. Income taxes and premium taxes may also be discussed. This discussion is a great transition into covering profitability and other important insurer ratios.

**Profitability Measures and Other Ratios**

Traditional profitability measures, such as return on assets and return on equity can be calculated and discussed. An important measure of underwriting profitability, the combined ratio and its components (the loss ratio and the expense ratio) can be introduced. The combined ratio can also be used to demonstrate the importance of investment income, as an insurer's combined ratio may exceed 100 percent, but the underwriting loss can be offset by investment income. Loss ratios for individual insurance lines can be considered. The importance of operating efficiently, as measured by the expense ratio, may also be covered.

Most junior and senior students will have taken a corporate finance course and understand the concept of financial leverage. Bottom-line net income becomes more volatile as the company's fixed financial obligations, as evidenced by debt financing, increase. The analog for insurers, underwriting leverage, can be covered in the project. The ratio of net premiums written to surplus demonstrates the concept. Just as a company can benefit from using debt financing if things go well, an insurer can benefit from a high ratio of net premiums written to surplus if losses are low. The downside of leverage is also discussed. If things don't go well and debt financing was used, the interest must still be paid. If an insurer writes a high level of premiums relative to surplus, and losses are high, the insurer is likely to have an underwriting loss. The use of proportional reinsurance, such as quota share, can be introduced as a way of reducing underwriting leverage.

Another ratio discussed is the surplus and capital ratio, the ratio of surplus and capital to total assets. The balance sheet equation, assets equal liabilities plus owner's equity (capital) is reviewed. Then this general equation is applied to insurers. Asset valuation under statutory accounting is discussed, as well as the estimation of loss reserves. The ability to write more coverage (underwriting capacity) and to absorb underwriting losses because of a strong surplus position, are explained.

**Organizational Structure and Regulation**

Diverse organizational structures are a characteristic of the insurance industry. A question on the project asks students to specify whether the company being analyzed is a mutual company, a stock company, a fraternal, or a group of companies under common ownership. A follow-up question can examine the implications of the organizational structure. For example, "Why are mutual life insurance companies more likely than stock companies to issue participating policies (policies that allow the payment of dividends to policyholders)? or "Why is it easier for stock insurance companies than for mutual insurers to raise capital to fund acquisitions?"

Regulation of insurers can also be introduced. The Best's exhibit provides a map showing the states in which an insurer is authorized to operate. This provides an excellent opportunity to discuss regional versus national companies and differences in regulatory scrutiny from state to state. New York has large population centers, yet many insurance companies do not operate there or only operate there through a subsidiary licensed only in New York. This fact motivates a discussion of state regulation and how regulatory stringency varies from state to state. It can also motivate a timely discussion of why property and liability companies may avoid or withdraw from certain states because of the risk of certain perils. Hurricane risk, the risk of earthquakes, and wildfire risk are excellent current examples. Use of reinsurance can be discussed for insurers choosing to operate in states where the potential for catastrophic loss is present, or for insurers wishing to withdraw from a rating territory.

**Other Areas**

An instructor is free to discuss other concepts with students. The rating assigned by A.M. Best and the importance of the rating may be discussed. For example, some corporate risk management policy statements will not permit using a lower-rated insurer (e.g. below A-) to be used. An independent agent authorized to place business with several insurers may stop placing business with a carrier that has been downgraded if higher-rated company options are available to him or her. Other ratings agencies (e.g. Moody's, S&P, Kroll, and Fitch) may be cited.

An instructor may examine the components of an insurer's investment portfolio. The distribution of corporate bonds, U.S. government bonds, asset-backed securities, common stock and preferred stock may be covered. Differences between life insurance company portfolios and those of property and liability insurers can also be discussed, emphasizing the concept of duration. The matching principle from corporate finance is helpful in this discussion. That principle states that sources and uses of funds should be matched. Applied to insurers, life insurers have longer duration portfolios as their contracts may be in force for decades (e.g. whole life policies). Property and liability have shorter duration portfolios as their contracts are for much shorter time periods (e.g. homeowners policies often provide coverage for one year while auto insurance policies may be in force for six months).

Some other topics an instructor might want to cover include: the company's product mix (personal lines vs. commercial lines, individual coverage vs. group coverage, life insurance vs. annuities), use of reinsurance, claims-made versus occurrence liability triggers, board of directors composition, and differences between state of domicile and where an insurance company's chief operations are conducted.[13] Again, the question set is easily adapted to fit what the instructor wishes to cover.

## SUMMARY AND CONCLUSIONS

A time-tested insurance company analysis project applicable to several upper-level risk management and insurance classes was described. The project introduces students to insurance company financial statements and statutory accounting, profitability measures and other key ratios, organizational structure and insurance regulation, and other areas. An instructor may adapt the project to cover other topics he or she wishes to address. Some suggestions for using project are shared with instructors. The project also introduces students to an important source of information that may be assistance in the employment interview process.

[13] Georgia-based AFLAC and California-based Pacific Life shifted their domicile to Nebraska for premium tax reasons. Washington-based Symetra shifted its domicile to Iowa for regulatory reasons.

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## APPENDIX

### Project #1: Insurance Company Analysis

You were just hired by the Risk Manager of a large company as an "Insurance Analyst". The Risk Manager gave you an assignment. The company is considering changing insurers for several coverages. A number of insurers are willing to write the coverages. The Risk Manager has asked you to answer some questions about one of the insurers.

You will obtain an insurance company exhibit from the A.M. Best database available through the University Library. A.M. Best has been analyzing insurers since the early 1900s. Ratings assigned are similar to Moody's and S&P ratings for bonds. The rating is important as the risk management policy statement may include a rule that coverages can only be placed with "safe" insurers (e.g. an A- or higher-rated insurer). A "Best Rating" is a composite measure, considering such things as asset quality, management, adequate loss reserve estimates, leverage, loss history, profitability, use of reinsurance, and other factors.

A.M. Best publishes company reports in large, bulky, books. The material is dated as the books are published annually and there's a time lag. The books also present limited data due to space limitations. Best also provides their information through an on-line database that is frequently updated.

Answer the following questions about your company. Write your answers on separate paper. The answer format is short answer, but some answers require an explanation or a computation. Your answers may be hand-written, but must be legible. You do not have to retype the questions.

You have three weeks to complete the project—it's due at the start of class on (insert date here). Early submissions are welcome, late submissions will incur a one letter grade (10%) penalty. Projects not submitted by the start of class on (insert date here) will receive a score of zero. Submit the printout of your company exhibit along with your answers.

To conserve space, Best's usually quotes dollar values in thousands (000). For answers requiring dollar values, be sure to provide the ACTUAL DOLLAR VALUE – add the three zeroes back where needed. Also, use values for the latest COMPLETE CALENDAR YEAR—DO NOT USE OR REPORT "INTERIM" (partial year, e.g. "SIX-MONTH" or "NINE-MONTH") VALUES.

Most, if not all, of the information needed to answer the questions can be found in your company's exhibit. Your instructor will answer general questions about the project in class. If you are having problems finding answers to specific questions, consult your instructor. This project is to be completed individually.

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1. To find your company exhibit, follow these steps:
(The directions for accessing the database and searching for the company to analyze are provided here. A general description applicable to the author's university is provided below.)

   --access the University website and search for "University Libraries"

   --under the search box on the "University Libraries" home page, click on "Databases"

   --the Databases are listed alphabetically. Click on "B"

   --click on the link for "Best's Library Center"

--click on the red "A+ Insurance Reports" box. You now have access to reports on every insurance company that A.M. Best tracks. Type your company's AMB # in the search box. Your search will provide a link to the "Best's Financial Report" for your company that you can download and print.

You'll receive two points for accessing the database and providing a printout of your company's financial report when you submit your project. (2 points)

Use information provided in your company's exhibit to answer the following questions:

2. How can the Risk Manager get in touch with the insurer's home office? List the mailing address, phone number, and web page (if any). (1 point)

3. What Financial Strength Rating did A.M. Best assign to your company or group of companies? (e.g. A+, A-, B+) (half-point)

4. What is the ownership structure of your company or group of companies? Is your company a stand-alone mutual company, a stock company, a group of companies that are affiliated/pooled, etc.? (half-point)

5. Is the majority of net premiums written by your company personal lines insurance (e.g. homeowners, private passenger auto, etc.) or commercial lines insurance (e.g. workers compensation, commercial multi-peril, liability – occurrence, etc.)? (1 point, you must justify your answer)

6a. What is the dollar value of your company's or the affiliated companies' total assets? (half-point)

b. What are the two largest categories of assets, and what percentage of total assets does each category represent? (provide the asset category (e.g. Bonds), the dollar value (e.g. $75.0 million), and the percentage of total assets the category represents (e.g. 75% of total assets)) for each of the two largest categories of assets. (2 points)

7. Which two lines of insurance (e.g. workers' compensation and general liability, or homeowners and private passenger auto, etc.) accounted for the greatest share of net premiums written in the most recent year in the exhibit? Include dollar values and the percentages of net premiums written for each of these two lines (e.g. workers compensation, $3,500,000, which was 35% of direct premiums written, and general liability, $3,200,000, which was 32% of direct premiums written). (2 points)

8. Which two lines of insurance (e.g. workers compensation, homeowners, private passenger auto, commercial multi-peril, etc.) produced the highest net loss ratio in the most recent year, and what was the loss net ratio for each of these lines? (1 point)

9. Calculate your company's "return on assets" by computing this ratio:

$$\frac{\text{Net Income (after taxes)}}{\text{Total Assets}} = \text{Return on Assets}$$

(1 pt., show your work, your answer may be negative)

10. From which two states did your company derive the most direct premiums written (DPW) and how much premium income was received from each of these states? (e.g. Florida $23,000,000 and Georgia $18,000,000) (2 points)

11. In competitive insurance markets, it is essential for insurers to hold the line on expenses. What was your insurer's "expense and policyowner dividend ratio" for the last full-year depicted in your exhibit? (half-point). Discuss the trend of your insurer's expense ratio for the last three or four years. (1 point)

12. What was the dollar value of your company's "net losses and LAE (loss adjustment expenses) incurred" for the most recent year and your company's "underwriting expenses incurred"? Provide the Income Statement values. (1 point)

13. Calculate your company's surplus and capital ratio (as specified below) and explain the significance of your company's ratio:

$$\frac{\text{Total Assets} - \text{Total Liabilities}}{\text{Total Assets}} = \text{Surplus and Capital Ratio}$$

(one point for the calculation (you must show your work), and one point for your explanation of the significance (Why is this ratio important? What does this ratio measure?))

14a. What are your company's two largest liability accounts? (name them and provide the dollar values, 1 point each)

b. What does your company's "loss reserve" measure? (1 point)

15. What was your company's combined ratio (loss ratio plus expense ratio) in the most recent year in the exhibit? (half-point) Does your company's combined ratio indicate that the company made money or lost money on underwriting activities in the most recent year shown in the exhibit? (half-point) Discuss whether your company's underwriting profitability has been improving or declining as indicated by the combined ratio over the past few years. (1 point)

16. According to the Income Statement, what were your company's net underwriting income and net investment income in the most recent year? (half-point each, note -- net underwriting income may be a negative value)

17a. What was your company's ratio of net premiums written (NPW) to surplus in the most recent year? (half-point, this ratio is provided in the exhibit)

b. If this ratio increased by 20 percent (e.g. from 2.50 to 3.00) while surplus remained constant, would this change represent an increase or a decrease in operating risk for the company? Explain your answer. (1 point)

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Reminders: Do not use or report "interim" (partial year) values. Also, where appropriate, report the actual dollar values, not the values in "thousands." Do your own work.

# An AI-Allowed RMI Project On Insuring Emerging Risks

Yu Lei
Barney School of Business, University of Hartford

## ABSTRACT

This is a project developed for an undergraduate-level introductory principles of insurance class. Students are required to identify an emerging risk and develop an insurance product to cover it. AI use is allowed. The project helps students apply essential risk management and insurance concepts and enhance their critical thinking skills.

## INTRODUCTION

I teach an undergraduate level principles of insurance course. Students enrolled in this course are usually sophomores and juniors. As they do not have much experience with insurance themselves,[1] I have always been thinking about how to make the course materials more relevant and relatable to them. I used various projects over the years and recently developed a new project centered around emerging risks.

Schanz (2023) points out that many emerging risks arise from innovation and progress (such as social media and autonomous vehicles). As students grow up in the digital age and are generally tech-savvy, having them figure out how to identify and insure emerging risks proves to be a fun and engaging project.

This project asks students to act as if they were an insurance company to develop a new product to cover an emerging risk of their choosing. They are then required to make a presentation to pitch their product to their classmates. See Appendix A for detailed project requirements. The rest of the article will walk through the various aspects of the project.

## LEARNING OBJECTIVES

- Understand the changing global risk landscape.
- Explain what are emerging risks.
- Understand the risk management process and know its application.
- Identify an emerging risk and describe its various components: sources, events, drivers, and consequences.
- Understand insurability criteria and know their application.
- Learn to assess the likelihood and severity of risks.
- Gain an understanding of underwriting factors in insurance pricing.
- Construct a mock insurance policy that includes key sections such as descriptions of risk exposures, limits of liability and premiums, losses covered, perils covered, and exclusions.
- Understand the importance and identify strategies of risk monitoring.

## OUTCOME ASSESSMENT

The deliverables of the project include: a PowerPoint slideshow addressing the project questions (detailed in Appendix A), a mock insurance policy (a sample of which is shown in Appendix B), a marketing piece that pitches their new insurance policy, an oral presentation in front of the class, and documentation of AI use (if any).

[1] They may have auto insurance and health insurance, but it's usually still on their parents' policies. Many of my students don't even know which auto or health insurance companies they use.

Students are evaluated on how well they prepare their PPT slides, marketing materials, and mock insurance policies. Their oral presentation in front of the class is also a major part of the assessment. Having students verbally articulate the project helps me evaluate their performance.

## PROJECT STRUCTURE

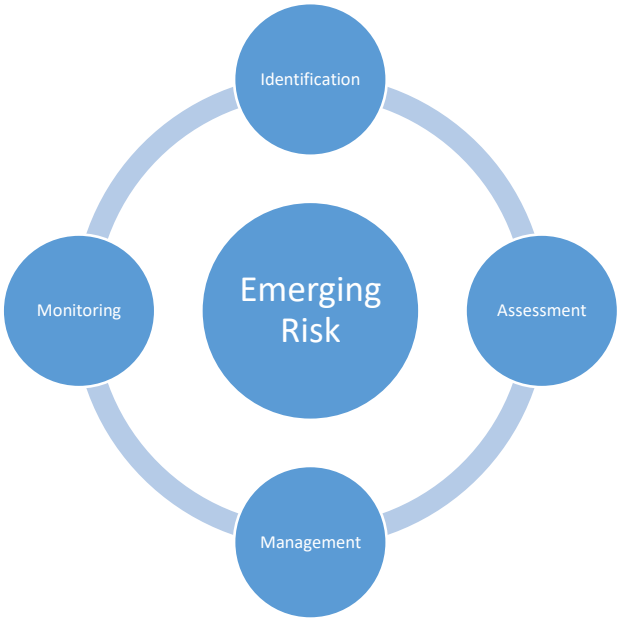
The project structure is based on the risk management process[2]: risk identification→risk assessment→ risk management→risk monitoring.

According to Schanz (2023),

> "Today's economies and societies are facing a transformation of risk, which is reflected in many of the major events of the past few years. The pandemic was a major systemic shock, affecting most of humanity at the same time, with long-term implications for risk perception and management. A similarly unimaginable geopolitical shift was the return and long-term effects of war in Europe. Climate risks are also seemingly spiraling out of control, while public and private intangible assets and data are under increasing threat from cyberattacks."

While the new global risk landscape poses significant challenges to insurance companies' capability to absorb insured losses, it also presents opportunities for insurers to develop new products to meet stakeholders' demand for coverage of emerging risks.

My project requires students to think from an insurer's perspective in applying the risk management process. They need to identify an emerging risk, assess its insurability and likelihood/severity, design a policy to cover it, and monitor performance of their policy. The following diagram shows the flow of the project:




[2] Risk professionals may state the process slightly differently but they generally include these four steps. For instance, Rejda, McNamara and Rabel (2024) describes risk management process as follows: identify loss exposures; measure and analyze the loss exposures; select the appropriate combination of techniques for treating the loss exposures; implement and monitor the risk management program.

**Risk Identification**

Students are asked to identify an emerging risk and design a new insurance product to cover it. If they pick a traditional insurable risk (such as a house fire), that is not considered an emerging risk. On the other hand, if they consider wild fires due to climate change, that could be deemed an emerging risk.

To help students better understand and identify emerging risks, I usually present the following information to them first.

The International Organization for Standardization (ISO) in its 2023 guidelines[3] states that "emerging risks are characterized by their newness, insufficient data, and a lack of verifiable information and knowledge needed for decision-making related to them." The International Risk Governance Council defines an emerging risk as "a risk that is new, or a familiar risk in a new or unfamiliar context or under new context conditions (re-emerging)."[4]

I use two examples to demonstrate what is a "new" risk and what is "a familiar risk" in a new context.

Generative artificial intelligence (AI) can be considered a new risk. While AI has been around for a long time, generative AI is different in that it can generate text, images, audio, and video by learning patterns from training data and use input (Mollick, 2024). Mollick (2024) also gives a very good overview of AI history and use cases of generative AI from a layperson's perspective. I am not an AI expert myself, but students have plenty to offer when I ask them how they use AI. Together we discuss what potential risks are there. For instance, *deepfake* videos generated by AI will harm the victim and using AI to help with homework may run into cheating and plagiarism issues.

Marijuana (cannabis) risk is an example of "a familiar risk" in a new context. I find that students are also very interested in discussing this risk. The U.S. Drug Enforcement Administration (DEA) considers cannabis a "Schedule I" drug ("drugs with no currently accepted medical use and a high potential for abuse"[5]). On May 21, 2024, the DEA proposed[6] to transfer marijuana from "Schedule I" to "Schedule III" under the Controlled Substances Act (CSA). "Schedule III" drugs are those "with a moderate to low potential for physical and psychological dependence."[7] A public hearing on the rule was scheduled to begin on December 2, 2024, but it was later postponed.[8] Should the proposed rule eventually pass, it would no longer be illegal to produce, possess, or use marijuana at the federal level.

I also refer students to Wells (2014), which discusses the coverage implications of the legalization of marijuana at the state level. Wells pointed out that in 2012, two states legalized marijuana for recreational use and an additional 18 states, plus the District of Columbia, had already legalized medical marijuana before that. In 2025, however, medical marijuana use is legal in 38 states and the District of Columbia; 24 states and the District of Columbia allow recreational use of marijuana.[9] The changing legal environment at the state level will again change the nature of marijuana risk.

In addition to the two above emerging risk examples, I have students read "Horizon Scanning: A Practitioner's Guide," a report[10] published by the Institute of Risk Management. This report includes a risk radar (on page 9) to illustrate how risks may emerge from various sources, including technological sector (artificial intelligence, blockchain, nanotechnology, cyber risk), regulatory/legal sector (climate change liability, regulatory uncertainty), environmental sector (pandemics, extreme weather), and social/political/economic sector (shifting geopolitical landscape, sharing economy, supply chain disruption, longevity risk).

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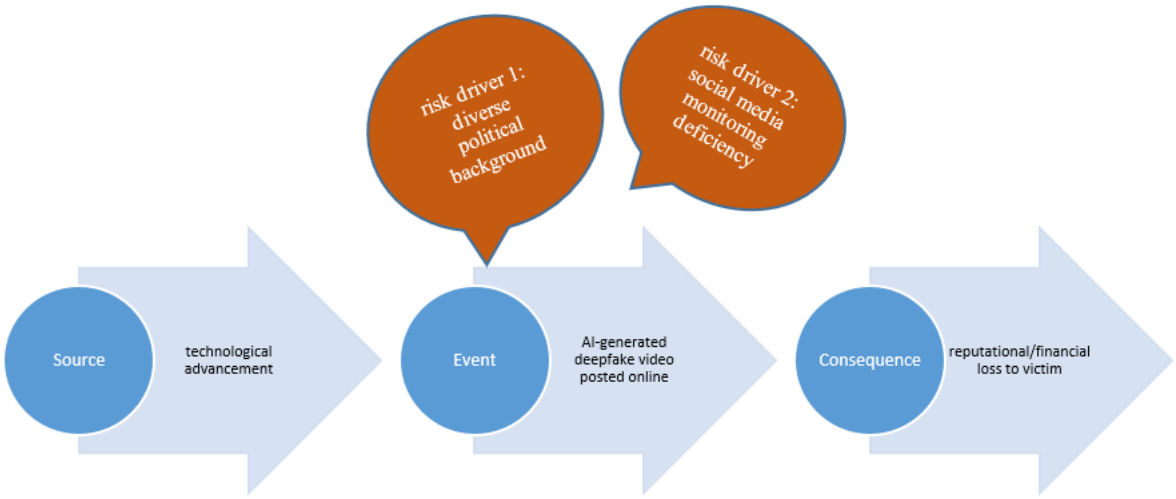
[3] https://cdn.standards.iteh.ai/samples/54224/c9150993cfd84591aed5153965c11cd8/ISO-TS-31050-2023.pdf
[4] https://irgc.org/risk-governance/emerging-risk/
[5] https://www.dea.gov/drug-information/drug-scheduling#:~:text=Schedule%20I%20drugs%2C%20substances%2C%20or,)%2C%20methaqualone%2C%20and%20peyote.
[6] https://www.federalregister.gov/documents/2024/08/29/2024-19370/schedules-of-controlled-substances-rescheduling-of-marijuana#:~:text=On%20May%2021%2C%202024%2C%20the,marijuana%20has%20a%20currently%20accepted
[7] https://www.dea.gov/drug-information/drug-scheduling#:~:text=Schedule%20I%20drugs%2C%20substances%2C%20or,)%2C%20methaqualone%2C%20and%20peyote.
[8] https://www.jdsupra.com/legalnews/cannabis-rescheduling-hearings-6724165/#:~:text=Read%3A%20Cannabis%20Rescheduling%3A%20The%20DEA,to%20participate%20in%20the%20hearing.
[9] https://klrd.gov/2024/12/18/medical-marijuana-update-2025/#:~:text=Medical%20marijuana%20use%20is%20legal,recreational%20marijuana%20use%20in%20Kansas.
[10] https://www.theirm.org/media/7423/horizon-scanning_final2-1.pdf

Schanz (2023) also lists some good examples of emerging risks, including tangible risks (climate change, food/water shortages, cyberattacks on critical infrastructure), and intangible risks (loss of reputation, social-political instability and common cyber risks).

Once students identify their emerging risks, I ask them to follow an innovative framework proposed by Schanz (2023). This framework defines the following dynamic components of risk (pages 12-13):[11]

- Sources: Elements that alone or in combination have the potential to give rise to risk.
- Events: The occurrence or change of a particular set of circumstances signaling the realization of a risk source's potential for impact.
- Consequences: The outcomes of risk events.
- Risk drivers: contextual elements, that without causing risks, affect their likelihood and/or severity.

I use AI risk to demonstrate the framework to students. The following diagram, based on Schanz (2023), shows how the various components of risk are related. AI risk may arise from technological advancement. Diverse political background may increase the chance of someone creating and posting *deepfake* videos about other people. The deficiency of social media platform monitoring mechanism may increase the severity of loss as the longer the video remains posted online, the more harm it causes to the victim.




**Risk Assessment (Insurability, Likelihood/Severity, Underwriting Factors)**

Curtis and Carey (2012), a study commissioned by COSO (Committee of Sponsoring Organizations of the Treadway Commission), states that risk assessment involves developing assessment criteria, assessing risks, assessing risk interactions, and prioritizing risks. This part of the risk management process usually requires a lot of research and expertise. For my project, I ask my students to focus on insurability, likelihood/severity, and underwriting factors.

Before the assessment, students need to identify their target policyholder. The same risk scenario may concern different stakeholders. For instance, the *deepfake* video may concern the developer and provider of the relevant AI technology, the maker of the video, the social platform on which the video is posted, and the victim whom the video targets. Different stakeholders face different risks and may desire different types of insurance policies.

From an insurer's perspective, whether to meet the insurance demand partly depends on the insurability of the risk. Schanz (2023) follows Berliner (1982)'s insurability framework and assessed insurability

[11] Risk professionals use different terms to refer to same concepts. Using Rejda, McNamara and Rabel (2024) terminology, risk driver is called hazard and risk source is called peril.

of select emerging risks. The framework comprises the following nine criteria with actuarial, market, and societal dimensions (pages 22-23 in Schanz, 2023):

Actuarial dimension: 1) randomness and independence of loss occurrence; 2) maximum possible loss should be manageable for the insurer; 3) average loss per event should be predictable and manageable; 4) number of exposure units should be a lot; 5) no information asymmetries;

Market dimension: 6) insurance premiums should be both economically viable and reflect the expected cost of the risk; 7) the limits of insurance coverage should be clearly defined at reasonable complexity;

Societal dimension: 8) coverage must be in accordance with public policy and societal values (e.g., does not promote criminal behavior); 9) legal restrictions: coverage should be in accordance with current and future legal restrictions.[12]

Schanz (2023) acknowledges the challenge of assessing insurability of emerging risks. For instance, due to the difficulty of measuring the size of reputational losses, it is difficult to insure reputational risk.

For my project, I do not expect students to have the deep expertise to conduct a thorough and in-depth analysis of insurability. I ask them to follow Schanz (2023) and do a very preliminary analysis by using a three-level scale (highly problematic, potentially problematic, or unproblematic) in each criterion. For instance, for common cyber risks, Schanz (2023) considers meeting criteria of maximum possible loss, average loss per event, large number of independent exposure units, public policy, and legal restrictions to be unproblematic; meeting criteria of information asymmetries, feasible premiums, and coverage limits to be potentially problematic; and meeting criterion of randomness to be highly problematic.

Once students complete an insurability analysis, they are to assess the likelihood and severity of their chosen risk.[13] I refer students to Curtis and Carey (2012) for how to define risk assessment criteria. The report uses a 1-5 scale for both severity (with 1 being incidental and 5 being extreme) and likelihood (with 1 being rare and 5 being frequent). Students are free to define their assessment criteria, but they should be able to justify their assessment of their chosen risk. For instance, Schanz (2023) believes that the severity of common cyber risks is relatively low because the average cost of a data breach and ransomware attack is estimated at around 4.5 million dollars for insurers.

The assessment of likelihood and severity is to help price insurance product. Actuarial expertise is required in insurance pricing. For my project, I simply ask students to identify four underwriting factors that may affect premium rates.

I use auto insurance as an example. Some underwriting factors that may affect auto insurance rates include: age, gender, use of car, and driving history. How do these underwriting factors affect auto insurance premium rates? Brief explanations follow:

- Age: Usually younger people are more likely to get into accidents and thus pay higher premium rates than older people.
- Gender: Usually males are more likely to get into accidents and thus pay higher premium rates than female drivers.
- Use of car: The more people use their car (driving more miles), the higher the premium rates.
- Driving history: If one has a lot of accidents and/or traffic violations, they face higher premium rates.

**Risk Management**

There are many techniques to manage risk. My project asks students to focus on the use of risk financing and develop an insurance policy to cover their identified risk. I remind students that insurance policy forms are complex legal contracts and must meet state regulatory requirements. I refer them to Rejda, McNamara and Rabel (2024) examples of comprehensive personal auto and homeowner insurance policies. For the purpose of the project, I only ask students to include the following key sections (Appendix B shows a sample mock insurance policy).

[12] Rejda, McNamara and Rabel (2024) lists six insurability criteria similar to the actuarial and market dimensions in Schanz (2023), which has additional criteria in societal dimension.

[13] While usually this part of risk management also involves computing risk scores to prioritize risks, I skip this step since this project only focuses on one risk.

Section 1: Declaration page:

- This page should contain information about the insurer, the insured, the policy period, and description of the insured risk exposure. It should also provide a schedule of coverage that indicates detailed coverage types, policy limits, deductibles (if any), and corresponding premiums.

Section 2: Insuring Agreement

- This section should provide detailed description of covered losses. I ask students to specify four types of losses.

Section 3: Covered Perils (Causes of Losses)[14]

- This section should provide detailed description of covered perils. I ask students to specify four examples of perils.

Section 4: Exclusions

- This section should provide detailed description of excluded perils. I ask students to specify four examples of exclusions.

**Risk Monitoring**

Once an organization goes through the first three steps of the risk management process, they need to keep monitoring their program to see if there are any changes in risk profile, any new risks emerging, and whether the techniques deployed are working effectively to manage the identified risks.

For my project, I only ask students to identify and discuss two strategies that can help mitigate adverse selection and moral hazard, both concepts discussed in my principles of insurance course before the start of the project.

I give students some examples to demonstrate this part of the project. For instance, auto insurance companies may use telematics to monitor driver behaviors; workers' compensation insurers may use AI tools to monitor social media posts to identify any fraud activities (such as a policyholder who claims to have back pain is shown in a video dancing around); insurers use big data analytics to monitor the trends of claims cost.

**AI ALLOWED**

The goal of this project is to engage students in a fun learning experience. To that end, I allow students to use generative AI at every step of the project. Of course, they are also required to document their use of AI.

I asked Google's Gemini to generate examples of emerging risks[15] that are relevant to college students and recommend relevant insurance policies. Below is one such example generated:

> "Digital identify and cybersecurity risks: increased reliance on digital platforms for education, social interaction, and financial transactions exposes students to risks like identify theft, phishing scams, and cyberbullying. The rise of AI-generated misinformation and *deepfakes* poses a threat to students' online reputation and academic integrity.
>
> It's relevant because students live much of their lives online. Data breaches at universities can expose sensitive student information. The consequences of online harassment or a damaged digital reputation can be severe.
>
> Possible insurance policies: digital identity theft protection insurance. Cyberbullying and online harassment legal defense insurance. Insurance against financial losses from cryptocurrency scams."

Students cannot just copy and paste what they get from AI. They need to do further research to determine whether the AI-generated content is accurate and if so how to use it for the project. I also require students to do an oral presentation of the project so I can fully evaluate whether they have a solid understanding of the project and are able to articulate its various aspects.

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[14] Many insurance policies are all-risk instead of named-peril policies. For the purpose of applying course materials, I ask students to list specific perils they want to cover.

[15] It's a multi-step promoting. I first asked Gemini to give me 10 examples of emerging risks that are relevant to college students. I then asked why these risks are relevant to students. After that, I asked what kind of insurance policies may be developed to cover such risks.

Mollick (2024) suggests that we use AI as co-intelligence. It is my experience that incorporating AI in the project makes it more interesting and fun for students.

## IMPLEMENTATION AND EXPANSION OF MY PROJECT

I emphasize that this project is a highly simplified exercise to apply the risk management process, which usually requires organizations to identify risks in a holistic way, prioritize key risks, and design effective programs to manage them. My project only focuses on one emerging risk as I find it easier for undergraduate students to grasp.

I make this project a semester-long assignment. I usually spend one lecture early in the semester to discuss the big picture of the project, i.e., what it entails. Then as the semester progresses, I refer students back to different parts of the project and provide more details. For instance, when I discuss what is risk and risk management process, I talk more about emerging risks as presented earlier in this paper. When I get to the insurance contract part, I refer to the mock insurance policy in more details. I guide students to work on relevant parts of the project as we move through our course materials. Oral presentations are usually scheduled for the end of the semester.

Students are divided into groups and work on the project. Each group is to independently identify their own emerging risk and design an insurance policy to cover it. As can be seen from above, the project requires the application of the risk management process and the insurance contract structure. Since my students are mostly sophomores and juniors, I do not expect them to do too much in-depth analysis but instructors teaching higher-level courses may wish to ask their students to conduct more thorough analysis at each step of the project. Additionally, I do not require students to submit a written report, but more advanced courses may wish to have students do a report in addition to making an oral presentation.

While each group in my class does a different risk, instructors may also choose to have the entire class work on the same risk faced by the same policyholders to see which group comes up with the most innovative insurance coverage. Another alternative is to have students work on the same risk but design different policies targeting different stakeholders (such as AI risks involving AI developers, company users, and individual users).

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# APPENDIX A: RESEARCH PROJECT

**Instruction:** Identify an emerging risk and develop an insurance product to cover it. The required deliverables include the following:

- A PowerPoint slideshow addressing parts 1-4 questions detailed below.
- A mock insurance policy.
- A marketing piece that pitches your new insurance policy. This could be a video, a brochure, a mock insurance quotes website, or any other creative work.
- An oral presentation in front of the class.
- Documentation of AI use (if any) [you are allowed to use AI to help you generate ideas. However, you must clearly indicate so wherever in the project you used AI. You should document the prompts used and the results you get.]

**Part 1: Risk Identification**

1) Identify an emerging risk and discuss what it is.
2) Provide a description of the risk in terms of source, event, two risk drivers (one possibly increasing the chance of risk event and other increasing the severity of risk event), and consequences. Use the following chart as a guide.

| Risk Descriptions | Example: Bitcoin Risk | My Risk |
|---|---|---|
| Source | use of Blockchain technology | |
| Event | hack on crypto exchange | |
| risk driver 1 | insufficient security measures | |
| risk driver 2 | lack of regulatory measures | |
| Consequences | loss of bitcoin | |

**Part 2: Risk Assessment**

3) define and discuss your intended policyholder
4) do an insurability study following Table 2 on page 24 in Schanz (2023). Remember you need to justify your assessment during your oral presentation.

| Insurability Criteria | Example: Common cyber risks (data breaches, ransomware) | My Risk |
|---|---|---|
| randomness and independence of loss occurrence | highly problematic | |
| Maximum possible loss | unproblematic | |
| Average loss per event | unproblematic | |
| Number of independent exposure units | unproblematic | |
| Information symmetries | potentially problematic | |
| Insurance premiums | potentially problematic | |
| Coverage limits | potentially problematic | |
| Public policy | unproblematic | |
| Legal restrictions | unproblematic | |
| Source: Example is from Schanz (2023) | | |

5) Define your risk likelihood and severity criteria (you may follow the charts on pages 4-5 in Curtis and Carey, 2012). Assess the likelihood and severity of your identified risk using the criteria. Remember you need to justify your assessment during your oral presentation.

6) Identify four underwriting factors and discuss how they may affect premium rates.

**Part 3: Risk Management**

7) Construct a mock insurance policy to cover your chosen emerging risk (see Appendix B for a sample policy). Remember to include all required sections.

**Part 4: Risk Monitoring**

8) Design a marketing piece to pitch your insurance product.
9) Identify and discuss two strategies that may help mitigate adverse selection and moral hazard.

**References**

Curtis, P. & Carey. M. (2012). Risk Assessment in Practice. https://www.deloitte.com/content/dam/assets-shared/legacy/docs/services/risk-advisory/2022/Riskassessmentinpractice.pdf

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## APPENDIX B: INSTRUCTION ON BUILDING A SAMPLE INSURANCE POLICY

Your policy must include the following four sections:

Section 1: Declaration page

- This page should contain information about the insurer, the insured, the policy period, and description of the insured risk exposure.
- It should also provide a schedule of coverage that indicates detailed coverage types, policy limits, deductibles (if any), and corresponding premiums.
- Your sample policy must specify four (4) types of losses to be covered.

Section 2: Insuring Agreement

- This section should provide detailed description of covered losses.
- Your sample policy must specify four (4) types of losses.

Section 3: Covered Perils (Causes of Losses)

- This section should provide detailed description of covered perils.
- Your sample policy must specify four (4) examples of perils.

Section 4: Exclusions

- This section should provide detailed description of excluded perils.
- Your sample policy must specify four (4) examples of exclusions.

See below for a sample policy for Bitcoin Safe Insurance. The policy form is based on the Personal Auto Policy in our textbook: Rejda G., McNamara M., & Rabel, W. (2024). Principles of Risk Management and Insurance (14th Edition). Pearson.

### Section 1: Declaration Page

**Insurance Company:** BitcoinSafe Harbor
**Phone:** 123-456-7899
**Address:** Cloud Street, Nowhere State, Anywhere World, 99999

**Policyholder:** Bitcoin Sample, Anywhere, World 00000

**Policy Number:** 111 B 222

**Policy Period:** From November 1, 2025 to November 1, 2026
(Policy period begins and ends 12:01 A.M. standard time in insured's location.)

**Description of Insured Property:**

Bitcoin – first decentralized cryptocurrency that was created in 2008 by an unknown person (or group of people) using the alias Satoshi Nakamoto. It is not Ethereum, Dash, Litecoin, or any other digital currency. (Source: https://www.investopedia.com/terms/b/bitcoin.asp)

**Schedule of Coverage:**

| Coverage | Limit of Insurance | Deductible | Premium |
|---|---|---|---|
| Loss of Bitcoin | $2 million | $10,000 | $20,000 |
| Defense Cost | $1 million | 0 | $7,000 |
| Cyber Extortion | $0.3 million | $ 3,000 | $8,000 |
| Business Interruption | $ 2 million | 5 Days | $10,000 |
| | | **Total Premium** | $45,000 |

## Section 2: Insuring Agreements

- Loss of Bitcoin
  - We will pay for loss of bitcoin as a result of a covered peril, subject to applicable deductible.
- Defense Cost
  - We will pay for defense cost should insured be sued as a result of bitcoin loss caused by a covered peril.
- Cyber Extortion
  - We will pay for the ransom demanded, subject to applicable deductible. You must report the cyber extortion to authorities first.
- Business Interruption
  - We will pay for up to five business days of lost income as a result of bitcoin loss caused by a covered peril.

## Section 3: Covered Perils (Causes of Loss)

- Cyber Attack
  - Hackers gaining control of insured's bitcoins by sabotaging their electronic devices, computer systems, or local networks.
- Accidental Physical Damage
  - Accidental physical damage to insured's electronic devices that renders their stored bitcoin information inaccessible.
- Theft of Physical Property
  - Theft of insured's electronic devices, flash drives, notebooks, or other physical media where insured records bitcoin information.
- Power Outage
  - Power outage that disrupts insured's operation that subsequently causes loss of bitcoin.

## Section 4: Exclusions

We will not pay for loss caused by:

- A 51% Attack
  - "A 51% attack is an attack on a cryptocurrency blockchain by an entity or group that controls more than 50% of the network. If a party were to gain this much control of a network, it would have the power to alter the blockchain." (Source: https://www.investopedia.com/terms/1/51-attack.asp)
- Price Fluctuation
  - Normal fluctuation in bitcoin prices due to market factors (such as demand and supply).
- Government Seizure
  - A government confiscates insured's bitcoin for breaking the law.
- Deliberate Acts
  - Insured's intentional, fraudulent, or criminal acts that cause loss of bitcoins.

# An Evaluation of the Effects On Student Learning of Giving Feedback On exam Performance in Risk Science Education

Eirik Bjorheim Abrahamsen
Department of Safety, Economics and Planning, University of Stavanger, Norway

Morten Sommer
Department of Safety, Economics and Planning, University of Stavanger, Norway

Håkon Bjorheim Abrahamsen
Department of Safety, Economics and Planning, University of Stavanger, Norway
Department of Anaesthesiology and Intensive Care, Stavanger University Hospital, Norway

Frank Asche
School of Forest, Fisheries, & Geomatics Sciences, University of Florida, USA
Department of Safety, Economics and Planning, University of Stavanger, Norway

Roy Endre Dahl
Department of Safety, Economics and Planning, University of Stavanger, Norway

## ABSTRACT

Many students prefer to have a justification on their exam performance, beyond just publishing the grades. The main argument is increased student learning. In this paper, we discuss whether it is appropriate to provide the students with justification on their exam performance. The expected utility theory is used as the basis for the discussion. We show that giving the students feedback on their exam performance does not necessarily improve their learning. This may actually reduce student learning. The focus is on students in risk science education at University of Stavanger in Norway, but the discussion is to a large extent general.

Key words: feedback on exam; student learning; system thinking; effects; higher education; economy; expected utility theory; risk science education

## INTRODUCTION

From an educational point of view, Dewey (1916) claims that learning is a dual process consisting of 'trying' (experiencing something) and 'undergoing' (thinking or reflecting about the experience). For any activity to lead to learning, the focus must be on the realisation of the activity rather than merely on the external product of the activity. Dewey recognises the importance of focusing learning activities on individuals and their understandings, rather than on the concrete manifestations of these understandings. Reflection is thus a crucial activity for students to truly learn. The concept of reflection can broadly be defined as "a more or less deliberate and conscious process of interpreting and making sense of experience" (Ellström, 2006, p. 45). More specifically, reflection can be described as interconnected cognitive and emotional processes (thinking and feeling) focusing on the contents, processes or premises of certain activities – a process carried out mentally (self-reflection) or as individual or collective actions (Ellström, 2006). In general, the role of reflection is widely acknowledged as important to the learning process (Boud, Cressey, & Docherty, 2006; Kolb, 2015; Moon, 1999; Schön, 1983, 1987).

To facilitate student's reflection, assessment and feedback are essential. Based on the idea of constructive alignment, both teaching/learning activities and assessment tasks must be in accordance with the intended learning outcome (Biggs & Tang, 2011). Assessment is of special importance for both students and educational

institutions, as this says something about the students' academic achievements and qualifications after completing a course (Sadler, 2009, 2010). In addition, students usually spend most time and effort on the activities in which they are evaluated (and get grades), which means that students are most involved in the "assessment activities" and therefore learn most from working with these activities (Gibbs, 1999; Hargreaves, 1997).

Assessments can be summative or formative (Sadler, 2010); summative assessment is a summary record of attainment usually reported as a grade on a coarse scale, while formative assessment is information about how successfully some activity has been undertaken and advice about how it could be improved. Biggs & Tang (2011) elaborates on this, arguing that the most powerful enhancement to learning is feedback during learning:

> *"The purpose and effect of [formative and summative] assessments are so different it is a pity the word 'assessment' is used for both. Formative assessment is provided during learning, telling students how well they are doing and what might need improving; summative after learning, informing how well students have learned what they were supposed to have learned. In one project we were involved in, teachers regarded the comments they wrote on final assessment tasks as 'formative', despite the fact that the course was over. To avoid such problems, we use the term formative feedback, not formative assessment" (p. 64)*

Among students in risk science education at the University of Stavanger, and at several Norwegian universities, there is a discussion about introducing mandatory justification of exam performance for students beyond just publishing the grades, rather than the current system where students have to be given a justification it is requested. The main argument for why this is important, is increased student learning – by requiring formative assessments of final exams, the belief is that feedback will provide insight and help the students to improve in the future. However, using a benefit-cost framework accounting for the professors' opportunity cost we show that giving all the students feedback on their exam performance does not necessarily improve the overall leaning outcome among students. The issue has a number of parallel in other settings. For instance, investments in new safety measures do not always give the intended effect, because competition for resources can lead new safety measures to crowd out existing measures (Abrahamsen et al., 2018). The effects on safety can then be less than intended, and in the worst case negative due to the reallocation of resources, if not all aspects of the new safety measures are taken into consideration (Abrahamsen et al., 2018). This is a well-known dilemma in the field of risk and safety management. A balance between production and efficiency on the one side and protection and acceptable performance on the other side has to be found (Reason, 1997), ensuring that the boundary of unsafe behaviour is not crossed due to pressure towards efficiency (Rasmussen, 1997).

Correspondingly, a requirement of mandatory justification of exam performance for students may unintentionally lead to changes and reduction in learning activities during courses. To compensate for the time used to provide formative assessments of final exams, teachers may be "forced" to use less resource demanding learning activities (e.g. traditional lectures instead of problem-based learning) or reduce the extent and quality of formative feedback given (e.g. limited feedback or only feedback on the final exam) at institutions where a specific share of a professor's time it to be used on teaching activities. A requirement related to mandatory justification of grades may then lead to reduced learning among students.

The paper is organized as follows. In Sections 2 and 3 we discuss what the effects are, of giving feedback on exam performance in higher education, on student learning. The discussion in Section 2 is mathematically oriented, while a graphically oriented discussion is given in Section 3. An example is given in Section 4. Finally, in Section 5 we draw some conclusions.

## A MODEL FOR ANALYZING WHAT THE EFFECTS ARE ON STUDENT LEARNING OF GIVING FEEDBACK ON EXAM PERFORMANCE

In this section, we formulate a model to consider the optimal investment levels in current learning activities contributing to student learning with the introduction of a new learning measure to investigate benefits and costs associated with mandatory feedback based on expected utility theory (Lindley, 1987), the main economic framework for decision making under uncertainty.

### 2.1 When investments of giving feedback on exam performance do not influence the outcome of other activities

Our first model ignores any interactions between the current and new learning measures on outcomes. We denote the current activities as *a* and the new learning measure as *b*. While *a* is all activities that currently affects student learning, we assume that *b* is feedback given to all students on their exam performance beyond publishing the grade (which is assumed part of *a*).

The optimal investment levels of *a* and *b* can be represented as a decision problem where the goal is to maximize the utility *u* (here utility can be interpreted as learning outcome) from student learning *l*. This is conditional on the resources spent on activity *a* and *b*. Mathematically, we can then define an expression for maximizing utility:

$$Max\ u(l(a(r_1), b(r_2))) \quad (1)$$

In this expression, $r_1$ and $r_2$ represents the resources spent on activities *a* and *b* respectively, where is assumed that more resources invested in an activity improves learning outcomes associated with that activity.

While it is assuming every investment in learning activities has a positive contribution to student learning, the law of diminishing marginal returns the positive effect on learning outcomes decreases as the investment in *a* learning measure increases. Accordingly, student learning is as an increasing and concave function in both *a* and *b*.

The optimal investment in $r_1$ and $r_2$, for the maximization problem 1, is at the point where

$$\partial u/\partial l \cdot \partial l/\partial a \cdot \partial a/\partial r_1 = \partial u/\partial l \cdot \partial l/\partial b \cdot \partial b/\partial r_2 \quad (i)$$

Hence, the optimal investment in the two measures *a* and *b*, is at the point where the marginal utility benefit of the investment in measure *a* , $r_1$, is equal to the marginal utility benefit of the investment in measure *b*, $r_2$. Consequently, the optimal investment in measure *b* (feedback on exam performance) is at the point where the utility of the last dollar (per professor hour) spent on measure *b* is equal to the utility of the last dollar spent on other measures (*a*).

Different combination of *a* and *b* will accordingly give different learning outcomes or utility. For instance, when the marginal utility benefit of measure *b* is higher than the marginal utility of measure *a*, one may increase the total utility if one allocates more money to *b* and less money to measure *a*. If the opposite is true, and the marginal utility of measure *b* is lower than the marginal utility of *a*, we may increase the utility if one invests less money in measure *b* and more money in measure *a*. This also implies that if the marginal benefit of investing in *b* is always lower than investing in *a*, it is sub-optimal to implement such measures.

### 2.2 When giving feedback on exam performance influences other investments for improving student learning

In general, different learning activities are expected to reinforce each other (Biggs and Tang, 2011). As such, while removing resources from activity *a*, activity *b* may increase the efficiency of the resources invested in activity *a*, potentially reducing the effect of the removed resources and possibly even improve the learning outcomes associated with activity *a*.

As a consequence, allocating resources to allow all students feedback on the exam beyond the grade, will reduce resources spent on current activities. Ignoring this fact may cause an overinvestment in the new learning measure. We expand our model in part 2.1 to incorporate this and our new decision model is

$$Max\ u(l(a(r_1(r_2)), b(r_2))) \quad (2)$$

Compared to the first model, the learning outcome from investments in *a* is now dependent on the resources spent on the new learning measure *b*. This effect is a negative contribution to *a* which needs to be

evaluated together with the positive effect from investing in *b*. In addition, the negative effect on *a* from investing in *b* also cause a negative effect on learning. In mathematical terms we say that *l* is an increasing and concave function in *b*; $\partial l/\partial b > 0$ and $\partial 2l/\partial b2 > 0$.

The optimal investment in $r_1$ and $r_2$, for the maximization problem 2, is at the point where

$$\partial u/\partial l \cdot \partial l/\partial a \cdot \partial a/\partial r_1 = \partial u/\partial l \cdot \partial l/\partial b \cdot \partial b/\partial r_2 + \partial u/\partial l \cdot \partial l/\partial a \cdot \partial a/\partial r_1 \cdot \partial r_1/\partial r_2 \ (ii)$$

Correspondingly to condition (ii), we see that the optimal investment in the two measures is at the point where the marginal utility benefit of the investment in measure *a* , $r_1$, is equal to the marginal utility benefit of the investment in measure *b*, $r_2$.

The left-hand side may be interpreted as the effect on utility from investment in $r_2$. The second term $\partial u/\partial l \cdot \partial l/\partial a \cdot \partial a/\partial r_1 \cdot \partial r_1/\partial r_2$ on the left-hand side of the equation reflects that 'feedback on exam performance' also gives a negative contribution to learning, as investments in *b* may contribute to a negative influence in current learning-promoting activities, *a*.

This means that if one invests in measure *b* (feedback on the exam) without taking potential negative side-effects into consideration, one may end up with a situation where one believes that one is investing in the two measures up to the point where marginal utility of the different measures are equal, which, in practice, is at this point the marginal utility of the investment in measure *b* is higher than the utility of a marginal investment in the other measures. See also Selvik et al. (2021). It then follows that the optimal investment in measure *b* is not appropriate, as the marginal utility benefit of measure *b* at this point is less than the marginal utility benefit of improvements in other measures. One can then increase the utility if some of the resources spent on measure *b* are transferred to investments in other student learning measures. Consequently, the optimal point in this model compared to our first model is always allocating less money to the new learning activity *b*.

One can easily extend the model to also cover trade-off effects between a professor's time spent on different student learning activities (*a* and *b*) and time spent on different research activities, *z*. To study such tradeoffs we can extend our model such as

$$Max\ u(l(a,b),z) \quad (3)$$

In Model 3 we may also include that an investment in one activity may influence investments in the other activities. To keep the calculations simple, we will in the following refer to the different student learning activities (*a* and *b*) as *v*, as shown in model 4, as there is no need to consider trade-off effects between *a* and *b*, as these trade off effects have already been studied in the previous model.

$$Max\ u(l(v(r)),z(s(r)) \ (4)$$

In Model 4, *r* and *s* represent the resources spent on teaching activities and research activities, respectively. The optimal investment point is then at the point where

$$\partial u/\partial z \cdot \partial z/\partial s = \partial u/\partial l \cdot \partial l/\partial v \cdot \partial v/\partial r + \partial u/\partial z \cdot \partial z/\partial s \cdot \partial s/\partial r \ (iii)$$

Correspondingly to condition (ii), we see that the optimal investment in the two measures is at the point where the marginal utility benefit of the investment in measure *v* is equal to the marginal utility benefit of the investment in measure *z*.

The left-hand side of condition *(iii)* may be interpreted as the effect on utility from investment in student learning activities (*v*). The term $\partial u/\partial l \cdot \partial l/\partial a \cdot \partial a/\partial r_1 \cdot \partial r_1/\partial r_2$ reflects that investments in teaching activities (including feedback on exam performance) may give a negative contribution to research activities, as investments in *v* may contribute to a negative influence in time spent on *z*.

From the economic analysis we see that a requirement on feedback on exam performance, originally referred to as *b*, may give negative contributions to other learning activities as well as to research activities. Exactly which effect a requirement of giving feedback on the exam for the students will have for each individual professor

will depend on his/her preferences. For some professors, the requirement will lead to less time spent on teaching and learning activities, with no changes in time spent on research activities. For others, the effect on the requirement will be less time spent on their research activities, without influencing the existing learning activities. Certainly, one may also end up in situations where the extra time required for giving all the students feedback on their exam influences both the time spent on research activities and the time spent on other learning activities.

One may also end up with a situation where the time spent on research activities and time spent on other learning activities will remain the same, despite a requirement of giving feedback to all students on their exam. The time spent on giving feedback to the students can remain the same both with and without the requirement. The quality of feedback to students may decline as a result of the requirement. The quality of the feedback for those students that ask specific after feedback on their exam (in the models above incorporated in measure *a*) may deteriorate as a result of a requirement providing feedback to all students on their exam performance.

## A GRAPHICAL ILLUSTRATION

The content of Section 2 can be represented using a graphical illustration to better understand the effects on student learning from giving feedback on exam performance in higher education. To a large extent we use the same setup as in the previous section and start by illustrating the optimal investment in two student learning measures for the expected utility maximiser when the two measures are not dependent.

### 3.1 When investments of giving feedback on exam performance does not influence other investments for improving learning among students

Assume that the investor can only choose between two investments, *a* and *b*. In this case, *a* is the sum of all other current learning measures, while *b* is the new learning measure, i.e. 'giving feedback on exam performance in higher education'. The investor is limited by a budget constraint S, and consequently the sum of resources spent on a and b cannot be more than S.

Fig. 1 displays the possible combinations of resources spent on a and b, subject to a budget constraint S. The line represents the budget constraint, and crosses the x-axis on *S1* where all resources S are spent on the current learning measure a. In the same way, if all resources are spent on the new learning measure b, it crosses the x-axis on S2. The line is linear since the budget constraint is constant.

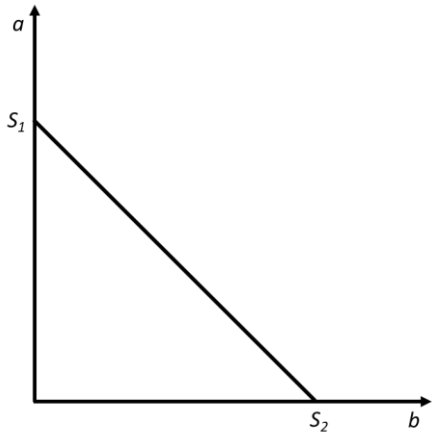


Fig. 1. Budget constraint for the two student learning measures.

A rational investor will always choose more rather than less. And in Fig. 1 we see that the investor receives more in return when choosing a combination outside or to the right of the budget constraint line, as opposed to a combination inside or to the left of this line. However, due to the budget constraint, the optimal choice occurs somewhere at the line where the full budget is utilized.

The optimal point at the line is decided by each investor's preferences. Some investors will value the return from a higher than *b*, and therefore choose to invest more in *a* than *b*. Other investors will prefer the opposite and consequently invest more in b. These preferences can be illustrated using indifference lines which shows a set of combinations between *a* and *b* where the investor value the combinations equally with regards to satisfaction or utility and therefore are indifferent between the two options. Since every level of satisfaction has its own indifference curve, there are an infinite number of them.

Fig. 2 displays three indifference curves, each representing a level of satisfaction or utility for the investor. Since the rational investor always choose more rather than less, the investor will prefer a combination providing a higher utility. In Fig. 2, a combination of *a* and *b* on line $u_2$ provides more utility than a combination on line $u_1$ and $u_2$ is therefore preferred over $u_1$. Likewise, $u_3$ is preferred over $u_2$. These preferences are also illustrated by comparing the points A, B and C where C provides the highest utility.

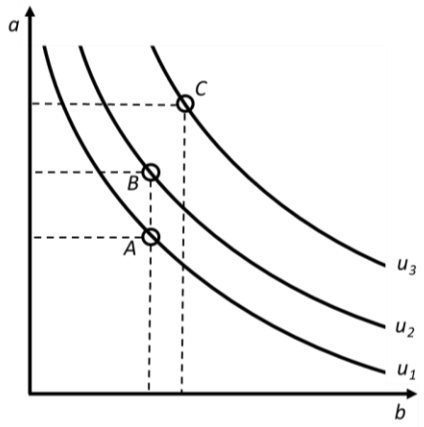


Fig. 2. Indifference curve map for *a* and *b*.

Using the indifference curves together with the budget constraint line, we can choose the optimal combination and decide how much we will invest in the new learning measure b compared to the current learning measures a. In Fig. 3 we use this approach to maximize the utility for a university and its budget. The budget constraint line touches the indifference curve u1 at two points, *D* and *F*. However, both alternatives are suboptimal compared to *E* which is at indifference curve $u_2$, and consequently provides a higher utility or satisfaction. Note that going from *D* to *E*, require the university to spend more on the learning measure *b* and less on the current learning measures a. Likewise, going from *F* to *E* requires the opposite. Nonetheless, the university cannot reach a utility higher than $u_2$, i.e. indifference curve $u_3$, due to its budget constraint, and option E maximizes the level of satisfaction and is the optimal choice. At this point, the university invests $r_1$ in a and $r_2$ in *b*.

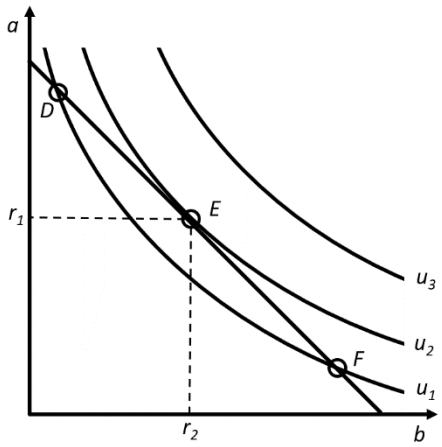

Fig. 3. Optimal investments in two different student learning measures.

### 3.2 When giving feedback on exam performance influences other investments for improving student learning

When choosing between two alternative investments, we also need to take into account the alternative cost. Investments in one measure may very likely affect investments in other measures (Abrahamsen et al., 2018), and with scarce resources, choosing one option over another may have a negative influence on the forlorn option. In this case, the alternative cost when investing in the new learning measure *b*, can be considered the negative effect from reducing the investment in the current learning measure *a*. Therefore, investing in a measure such as feedback on the exam to all students might cause negative side-effects on other measures that may also contribute to learning. With the scarce resources, i.e. the budget constraint, investing in *b* will require a reduction in *a*, as the mandatory feedback on exams to students may lead to changes in the course where the teacher needs to reassign resources from other learning activities like supervision of group assignments or lecturing.

The message is that investments in one measure can on one hand contribute to learning, but on the other hand may contribute to reduced investments in other measures which also leads to learning. The university may then end up with a situation where the learning contributed to the other investments are higher than the increased learning on that specific measure, and the overall effect on students' learning can then be negative. This is graphically illustrated in Fig. 4. While the budget constraint is fixed, the utility generated by learning measures *a* and *b* are now altered, as they both rely on a new relationship where the utility from one learning measure depends on the investment in the other. This is visible in the new indifference curve, $u_2^*$. With this indifference curve, the optimal decision is at point E*, which allocates more of the resources to current learning measures *a*, at $r_1^*$, due to the negative effect on *a* from investing in *b*.

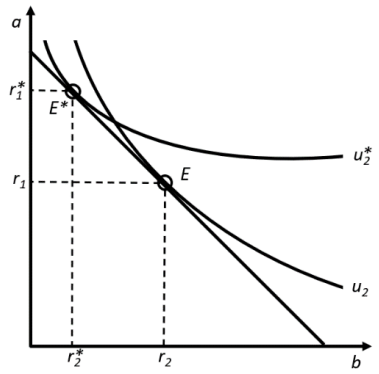


Fig. 4. By ignoring potential negative side-effects from one learning measure (measure *b*) leads to overinvestments in that measure and under-investments in other measures.

To the left of point E in Fig. 4 $\partial u_1/\partial u_2$ is greater than 1, meaning that the benefit of the last dollar spent on learning measure *a* is greater than the benefit of the last dollar spent on learning measure *b*. Thus, the benefit will increase if we reduce the investment in learning measure *b* and increases the investment in learning measure *a*. The optimal point will then be to the left of point *E* when we assume that investment in measure *b* contributes to negative side effects on measure *a*. This is the reason why the benefit of good *b* is lower if one considers negative side effects, compared to a situation where this aspect is ignored.

## AN EXAMPLE

At the University of Stavanger (UiS), to simplify the process of students requesting feedback, besides informing them of their rights, all students are asked if they want feedback from the exam once they check their exam result. Basically, they simply select the 'yes' alterative on the result website. Earlier such a digital solution (tool) was not available, and instead the students had to send a formal request through the exam office to claim the feedback. Basically, this was just sending an e-mail or signing a piece of paper with the subject ID and their name and giving this to the exam office. It was far from any time-consuming task, and no argumentation was needed. For the administrative staff, however, a benefit of the new way is that they save the time of notifying the lecturer and entering the information into the software system.

As mentioned in the introduction, the pressure towards requiring mandatory justification of exam performance from students have increased during recent years. In addition, with new digital possibilities emerging, there are incentives to make it easier for students to get feedback from exams if they want it. Technically, it is a simple task to make the necessary software adjustments to facilitate automatic feedback on exam performance. The direct cost of the change is small, and overall, it is a student friendly initiative. There are also other stakeholders involved, such as lecturers, in their role as internal examiners, providing the feedback. Although, the change is assumed not to matter much to them as it should not change their flexibility regarding how the feedback is to be given.

However, the challenge is that providing justification is time-consuming and resource- intensive. We find an example of this at UiS. After a change in the software was made a few years ago, making the feedback request digital, students who before would not have asked for feedback, started requesting it. The number of feedback request have then increased significantly. For instance, at the Faculty of Science and Technology at UiS, it was the autumn 2018 registered over three times as many feedback requests for the study programmes compared with the autumn 2017. The average at the study programmes changed from 7.4 to 24.0. For example, for the Bachelor programme in Physics and mathematics, the requests increased from around 30 to more than 100. It should be mentioned that, at the same time as the change in the software, it was required that the lecturer make the exam solutions available digitally to the students immediately after the exam have ended. This allows students the opportunity to compare their own exam performance with the exam solutions, helping them learn and find out how to improve in the future.

By requiring mandatory justification of all exam performance from students, the amount of time and resources occupied will increase even more. We can assume that providing a thorough feedback, which provide formative feedback that are suitable for students to truly learn from, will take around 30 minutes per exam in average. If the feedback is provided in writing, it takes that amount of time to make a thoroughly prepared piece of text, adapted to the individual student's exam assignment. And, if the feedback is given orally, a meeting with the student will typically take 10-15 minutes, in addition to preparation before the feedback meeting. Some differences may also exist in between technical and non-technical studies, between bachelors and master courses, and between different forms of exams, affecting the time needed to provide thorough feedback. But if we use 30 minutes (0.5 hour) as basis, the time used on feedback will be:

- 10 exam justifications → 5 working hours.
- 30 exam justifications → 15 working hours.
- 100 exam justifications → 50 working hours.
- 200 exam justifications → 100 working hours.

As we see, lecturers will have to spend notably more time (resources) on providing justification on exam performances – time that will have to be taken from learning activities during courses before the exam. Losing several days, and even weeks, of teaching/learning activities during a course could have dramatic consequences for the students learning. The same if the amount of formative feedback given to students during a course is reduced significantly or not given at all. As Biggs & Tang (2011) emphasise, both suitable teaching/learning activities and formative feedback during learning before the final exam are essential for good learning.

If we look at the curriculum of UiS's master degree program in Risk Analysis, we see that students shall acquire learning outcomes in terms of knowledge, skills, and general competences:

- Knowledge
    - K1: has advanced knowledge within the academic field of risk science, related to concepts, theories, principles, approaches, methods and models for understanding, assessing, characterising, communicating, managing and governing risk, safety and security.
    - K2: has specialised insight into risk assessment and risk management with an engineering theory and method profile, or in risk governance with a social science theory and method profile, depending on the chosen specialisation.
    - K3: has in-depth knowledge of theories and methods that form the basis for and that characterise risk science.
    - K4: can apply this knowledge to new types of problems and issues, in particular practical cases and problems in society, industry, business, etc., such as achievement of the UN sustainable development goals.
    - K5: can analyse scientific issues based on the scientific area's history, traditions, uniqueness and place in society.
- Skills
    - S1: can evaluate theories, principles, interpretations, methods and models within risk analysis.
    - S2: can develop and apply methods and models in risk analysis; depending on specialisation, methods for risk assessment, reliability analysis, cost-benefit analysis and risk perception analysis.
    - S3: can plan and conduct analyses (interpreted in a wide sense) in an independent manner of risk, safety and security, using the above knowledge.
    - S4: can use relevant methods for research and scientific/scholarly work in an independent manner.
    - S5: can analyse and deal critically with various sources of information and use them to structure and formulate scientific/scholarly arguments.
    - S6: can carry out an independent, limited research or development project under supervision and in accordance with applicable norms for research ethics.

- General competence
    - GC1: can analyse relevant professional, occupational and research ethics issues.
    - GC2: can apply their knowledge and skills to deal with questions related to risk analysis, and in new areas to carry out advanced work tasks and projects.
    - GC3: is able to evaluate the applicability of different tools and approaches that are relevant to risk analysis, and examine the short- and long-term effects of different practices and solutions.
    - GC4: can disseminate extensive independent work.
    - GC5: is familiar with and can use the current terminology within the field.
    - GC6: can communicate about scientific issues, analyses and conclusions within the field, with both specialists and the general public.
    - GC7: can guide decision-makers and other stakeholders on how to understand, assess, manage and govern risk, safety and security.
    - GC8: can contribute to innovation and in innovation processes.

The knowledge part of the learning outcome, even though involving advanced knowledge in risk science, can be learned pretty well as long as the students go to classes and read the literature. Student's ability to memorize theoretical knowledge is thus the crucial element in this regard. The skills and general competence, on the other hand, requires a deep approach to learning, i.e. a focus on understanding rather than memorising and acquiring facts and procedures (Biggs, 1999; Gibbs, 1992). Hence, to learn to evaluate, develop, apply, analyse, communicate, etc., the students must do exactly this, both to learn through experience and learn through thinking and reflecting about the experience (i.e. 'trying' and 'undergoing' according to Dewey, 1916). As this is a demanding and time-consuming process, where the reflection should focus on the contents, processes, and premises of issues related to risk analyses (cf. Ellström, 2006), learning activities that encourage students to engage is essential. In addition, for this learning process to be efficient, students need formative feedback from a knowledgeable lecturer in the field of risk science (cf. Biggs & Tang, 2011). If this is not provided for, due to lecturers having to provide feedback on exam performance, students risk being hindered in developing the necessary skills and competence in risk analysis.

## CONCLUSION

In this paper, we have shown that giving formative feedback on all students' exam performance may affect the students learning negatively. A requirement of mandatory justification will be time consuming for lecturers to fulfil, with risk of taking resources from teaching/learning activities. Hence, to free time to give exam feedback, lecturers will have to reduce the time used on preparing lectures, supervising students, or other learning activities. The consequences can then be that the student learning during the semester is reduced, thus reducing exam performances over time. We therefore fear that introducing a requirement for mandatory justification of exam performance from students could be overall counterproductive.

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# Developing IRM Students For Claim Representative Positions: An Illustrative CGL Policy Claim

**William Warfel**

**Tim Query**

## ABSTRACT

Both authors have served as testifying expert witnesses in breach of contract cases. Countless times, the authors have reviewed carefully formal claim denial letters drafted by claim representatives in which the letter merely cited policy language that was not linked to the undisputed facts of the claim. That being the case, the claim representative failed to clearly identify the key coverage issues in the case. By not clearly identifying the key coverage issues, the claim representative then did not reference legal precedent that would have resolved the key coverage issues in favor of the insurance carrier. Of course, these kinds of mistakes on the part of a claim representative can lead not only to a breach of contract lawsuit, but also a bad faith lawsuit.

Particularly in upper level, undergraduate IRM classes such as Commercial Property, Commercial Liability, and Health Insurance, IRM faculty should instruct students in terms of (1) how to apply the plain text of policy language to the undisputed facts of a claim, with the goal being to identify the specific coverage issues upon which the applicability of coverage hinges, and (2) how to use legal precedent so as to resolve a key coverage issue in favor of the insurance carrier. The importance of doing so is underscored by the fact that many IRM graduates start their professional careers in the industry as claim representatives before moving forward into management, risk management, and production positions where salaries and upward mobility are higher.

This case study uses for illustrative purposes in the classroom a Commercial General Liability (CGL) Policy legal case in which one of the authors was retained by the plaintiff attorney as a testifying expert witness. Although the trial court ruled in favor of the plaintiff on a Motion for Summary Judgment filed by the insurance carrier, the result could have been easily different had the case been tried in a different jurisdiction with legal precedent that supported the coverage position of the insurance carrier. While defense counsel was thorough in drafting its Motion for Summary Judgment, the claim representative who handled the claim failed to link the policy language to the undisputed facts of the claim in the claim denial letter and failed to carefully articulate the key coverage issues connected to the disputed, liability insurance claim.

## INTRODUCTION

Most successful insurance and risk management (IRM) programs incorporate recruitment strategies into their courses, especially introductory courses. The incorporation of such strategies is partially motivated by the talent gap that the industry has been attempting to address for well over a decade. This talent gap is not a new phenomenon, as a survey taken by the Griffith Insurance Education Foundation and The Institutes (2012) confirmed that only one out of every 20 millennials were very familiar with the insurance industry. Conversely, about 80 percent of the millennials indicated that they were not familiar with the insurance industry. Fewer than 10 percent of the millennials confirmed that they were most interested in working in the insurance industry, including only 5 percent of these students. That said, 25 percent of the millennials were somewhat interested in working in the insurance industry. Stated reasons provided for a lack of interest in working in the industry included no interest in selling insurance (52 percent) and the perception that the industry was boring and lacked excitement (44 percent). Unfortunately, while there has been some improvement in terms of some of

the factors impacting the perception of the industry by millennials, room for substantial room for improvement remains, which the industry needs to address.

Karl and Wells (2016) hypothesized that when professionals in the insurance industry provide information to people less knowledgeable about the industry, those persons increase the positivity of their perceptions of the insurance industry. Their hypothesis is tested through using a seminar consisting of interactions between insurance professionals and underclassmen at a university. The results of the seminar significantly supported their hypothesis.

There are several ways for instructors to make learning more profound for students and assist in stimulating enthusiasm while expanding their understanding of relevant issues. Many of these methods revolve around "real world" applications. IRM faculty are consistently provided with a variety of situations connected to the application of IRM concepts to problematic issues within the insurance industry. For example, State Farm's decision in May 2023 to no longer write homeowners insurance for new accounts in the state of California certainly demonstrates some of the unique underwriting challenges facing insurers.

Inviting guest speakers to share their experiences and expertise with IRM students can be another effective way to draw into the classroom the application of IRM concepts to real world situations. IRM professionals represent some of the best recruiters for students who are considering their future options. A residual benefit is that most speakers are more than willing to tell their "stories" in terms of the path that they followed that eventually resulted in a high-level position in the industry. These "stories" oftentimes lead to sound career advice for IRM students. One positive consequence of the pandemic causing face-to-face classes to transform into online classes at virtually all institutions across the country is the increased use and acceptance of video conferencing. IRM Programs can now expose students to speakers from all over the world through the simple use of this technology. The Risk Manager on Campus Program sponsored by the Spencer Education Foundation offers grants to universities and colleges in the United States and Canada to host a practicing Risk Manager on its campus for a one-to-three-day residency.

While not as common, field trips are another option for familiarizing IRM students with how insurance companies' function. One of the authors has taken students to three different insurance company headquarters, agencies, a risk management consulting firm, and a statewide claims office. Some IRM Programs organize travel courses to international insurance hubs including, for example, London, the United Kingdom, and Bermuda. Travel courses of this sort effectively broaden perceptions of students in terms of the global reach of the insurance industry.

One unique way to connect potential IRM students to real world situations is by exposing them to legal cases in which the IRM faculty member served as a testifying expert witness. IRM and legal concepts are universally applied in these legal cases to help bring a dispute of one sort or another to an equitable resolution.

IRM courses, for example, include considerable discussion in terms of what constitutes an insurable exposure to loss. These requisites of insurability oftentimes explain the custom and practice in the insurance industry. Plaintiff attorneys oftentimes argue that a strict reading of the policy language should be avoided based largely on reasoning tied to what constitutes an insurable exposure to loss.

IRM concepts can be used to defend an insurance agent/broker who has been alleged to breach a professional responsibility based on a failure to procure a duplicative policy in a case in which a reduced settlement amount was paid under another insurance policy (e.g., the potential applicability of an exclusion contained in a warehouse legal liability policy procured for a firm that stores fruit in a cold warehouse leads to a reduced settlement amount; the agent/broker is sued based on failure to procure a miscellaneous professional liability policy, as well as the warehouse legal liability policy) (Warfel, 2008).

In an analysis of characteristics of expert witnesses, Godwin (2019) points out that the ability to reason is one which can be improved upon with practice. The application of reasoning and deduction to a legal case can be carried into the classroom, as well as individual advising of IRM students, thereby intellectually stimulating those students who are undecided concerning a future professional career and career goal, resulting in increased enrollment in IRM classes.

For whatever reason, relatively few IRM faculty members are taking advantage of testifying expert witness opportunities on both the plaintiff side and the defense side in all lines of insurance including liability insurance, property insurance, health insurance (medical, disability, long-term care), and life insurance. While one of the authors has worked mostly on the plaintiff's side as a testifying expert witness, there are over one hundred cases on his CV in which either a written report was prepared and/or opposing counsel took his deposition. All lines of insurance, referenced above, are represented on his CV, meaning that he has shared with IRM students his testifying expert witness experiences in Commercial Liability Insurance, Commercial Property Insurance, Health Insurance, and Life Insurance.

These testifying expert witness assignments have entailed the simple application of IRM and legal concepts to advance arguments that support the client's position. Given that most of the assignments have been on the plaintiff's side, he has reviewed countless final claim denial letters, many of which failed to link the policy language to the undisputed facts connected to the claim, thereby falling short in terms of a precise articulation of the coverage issues connected to the disputed claim. In the absence of a precise articulation of the coverage issues connected to the disputed claim, applying favorable legal precedent to resolve these coverage issues becomes problematic.

This case study is illustrative in nature, demonstrating how to apply the plain text of the policy to the undisputed facts connected to the claim. It concerns a liability insurance claim that was presented under a Commercial General Liability (CGL) Policy, a policy almost universally used by IRM faculty across the country in teaching property/liability insurance. It concerns legal concepts because of the existence of the underlying case, legal liability hinging on whether the named insured bears legal responsibility connected to a tragic incident that resulted in the death of the third-party claimant. Legal precedent has a bearing in terms of whether the claim fits within the ambit of an exception to an exclusion.

## RELEVANCE OF ILLUSTRATIVE LIABILITY INSURANCE COVERAGE CLAIM TO THE CLASSROOM

First, IRM students usually do not fully grasp the distinction between the underlying case and the liability insurance coverage case. The Insuring Agreement states that coverage hinges on the insured bearing legal responsibility for the legal detriment (damages related to the claimant's injury) suffered by the injured claimant — the personal injury attorney's client. Whether legal responsibility exists depends on the presence of the elements that comprise the legal action that has been filed by the injured claimant against the insured in the underlying case; duty of care, breach of the duty of care, causal connection between the breach of the duty of care and the legal detriment suffered by the injured claimant, and damages related to the legal detriment. Depending on the facts of the underlying case, problematic issues can arise connected to one or more of the elements that comprise the legal action that has been filed by the injured claimant against the insured in the underlying case. The illustrative case discussed in this teaching case study provides an example in terms of the sort of problematic issues in underlying cases that can result in a trial court ruling to the effect that legal responsibility on the part of the insured does not exist as a matter of law, meaning that there is no liability insurance coverage as a matter of law.

Second, IRM students usually do not fully grasp the importance of a mechanical application of the policy language to the facts of the case. Does the liability insurance claim fit within the terms of the potentially applicable liability insuring agreement (i.e., does the target of the underlying case qualify as an insured, what are the nature of the damages suffered by the injured claimant – economic loss or damages related to bodily injury

or property damage)? Does an exclusion take away coverage that otherwise fits within the terms of the applicable liability insuring agreement? Can an argument be made that a strict reading of the potentially applicable exclusion largely nullifies coverage, and is, therefore, at odds with the intent of the parties to the contract, and/or the reasonable expectations of the policyholder? Can an argument be made that custom and practice (e.g., avoiding unnecessary duplication of coverage, avoiding coverage for an uninsurable exposure to loss, providing only that coverage needed by a typical policyholder-all reasons commonly relied upon by insurers in inserting into an insurance policy a given exclusion) required that an exclusion not be applied to the liability insurance claim in question? Does the liability claim in question fit within an exception contained in the exclusion, in which case liability insurance coverage does exist? Does legal precedent confirm that an exclusion applies to the liability insurance claim in question, given the facts of the liability insurance claim? The illustrative case discussed in this teaching case study provides an example in terms of how these potentially problematic issues were addressed and overcome in the case in question by the author in his role as a testifying expert, with the result being denial of the insurer's Motion for Summary Judgment. There were facts in this case, however, that suggested the claim did not fit within the terms of the exception to the exclusion, confirmed by legal precedent in some jurisdictions including, for example, Connecticut.

## AN ILLUSTRATIVE CASE: THE ESTATE OF MIGUEL ANGEL GONZALEZ HUICOCHEA V. JOSE MOLINA, VIELKA MOLINA, GROCERY STOP, INC., D/B/A LOS CUNADOS GROCERY: IDENTIFICATION OF ISSUES IN THE UNDERLYING CASE

In this case, the family of Miguel Angel Gonzalez Huicochea, who was the clerk "filling in as needed" who was shot and killed in connection with an armed robbery that occurred at Los Cunados Grocery Store on November 13, 2009, filed a wrongful death lawsuit against the convenience store. Based on the Florida Wrongful Death Act, the Estate filed a lawsuit against Los Cunados Grocery Store alleging that (1) several criminal acts had been perpetrated in and around the premises of the grocery store during the twelve months immediately preceding the incident and, therefore, the grocery store had a duty to implement appropriate security measures designed to protect employees and customers from attacks of the sort that occurred in this case which were reasonably foreseeable, (i.e., there was a duty of care), (2) the grocery store failed to implement appropriate security measures including, for example, instructing employees to lock the entrance door to the convenience store at a certain time in the evening, (i.e., there was a breach of the duty of care), (3) this failure to implement appropriate security measures contributed to the occurrence of the incident in question, (i.e., there was a causal connection between the breach of the duty of care and the injury), and (4) as a result of the wrongful death of Miguel Angel Gonzalez Huicochea, the Estate suffered substantial, foreseeable damages.

Based on the strength of the underlying case (referenced above), as well as the potential for coverage under the Commercial General Liability (CGL) Policy that had been issued to Los Cunados Grocery Store, Hyram Montero, a personal injury attorney who practices in Fort Lauderdale, Florida, agreed to take this case on a contingency fee basis, and advance the costs of litigation. Under a contingency fee arrangement, the attorney agrees to take a stipulated percentage (typically one-third) of the settlement or judgment; if the lawsuit does not bear "fruit," the attorney is not compensated for his/her services. Advancement of costs means that the attorney absorbs the expense of pursuing litigation; these costs are deducted from the settlement or judgment before calculating the respective shares of the attorney and plaintiff (client); these costs are waived by the attorney if the lawsuit does not bear "fruit." As was the case with Miguel Angel Gonzalez Huicochea, many employees (and their families) who are injured/killed on the job have very limited resources. For this reason, unless a personal injury attorney is willing to take the case on a contingency fee basis and advance the costs of litigation, the employee lacks access to the courts, and is effectively precluded from seeking compensation for his/her workplace injury/death.

In the absence of legal liability on the part of the named insured in the underlying case, the employee does not receive compensation for his/her workplace injury/death. In this illustrative case, the issue concerning duty of care was prominent. This legal issue is resolved by the judge, and the filing of a Motion for Summary

Judgment seeking dismissal based on a lack of a duty of care is routine. Whether there was a duty of care hinges largely on whether the incident was foreseeable, as well as the existence of a relationship (referenced as a special relationship/reliance) between the claimant and the defendant (the insured) in the underlying case. Assuming the incident that resulted in an injury was foreseeable, there is a duty of care; otherwise, there is not a duty of care. In this illustrative case, a string of armed robberies had occurred in and around the premises of the grocery store during the twelve months immediately preceding the incident. If the armed robbery had occurred at a grocery store located in an affluent part of town, for example, the risk of dismissal of the underlying case as a matter of law would have been much greater. More generally, a variety of problematic issues may arise in connection with the underlying case.

## IDENTIFICATION OF COVERAGE ISSUES UNDER THE CGL POLICY

Not only may problematic issues arise in the underlying case, but also coverage issues may arise under the Commercial General Liability (CGL) Policy, which can effectively prevent compensation of an employee for a workplace injury/death. The illustrative case discussed above highlights several coverage issues.

**Does The Claim Fit Within The Insuring Agreement?**

The insuring agreement stipulates that "the insurer [Granada Insurance Company] will pay those sums that the insured [Los Cunados Grocery Store] becomes legally obligated to pay as damages because of 'bodily injury'…." "'Bodily injury' means bodily injury . . . sustained by the claimant [Miguel Angel Gonzalez Huicochea], including death…." Most importantly, the wrongful death claim against Los Cunados Grocery Store in the underlying case was based on the Florida Wrongful Death Act as opposed to the Florida Workers' Compensation Statute. Given that Miguel Angel Gonzalez Huicochea clearly qualified as an "employee," as defined under Section 440.02 of the Florida Workers' Compensation Statute, the question arises concerning whether Los Cunados Grocery Store may be held legally accountable for the wrongful death of Miguel Angel Gonzalez Huicochea based on the Florida Wrongful Death Act[1].Section 440.11 of the Florida Workers' Compensation Statute provides that "[t]he liability of an employer [under the Florida Workers' Compensation Statute] shall be exclusive and in place of all other liability . . . of such employer to . . . the employee, the legal representative thereof, . . . wife, parents, dependents, next of kin, and anyone otherwise entitled to recover damages from such employer at law . . . on account of such … death…."

In this illustrative case, notwithstanding the fact that generally the exclusive remedy for an "employee," as defined under the Florida Workers' Compensation Statute, is the benefits provided under this statute, the Estate of Miguel Angel Gonzalez Huicochea was not bound by the doctrine of exclusive remedy. Section 440.02 of the statute stipulates that "'[e]mployment' includes . . . [a]ll private employments in which four or more employees are employed by the same employer…." In this illustrative case, Los Cunados Grocery Store regularly employed only two people (the owner, and the owner's father-in-law). For this reason, the owner had the right to opt out of the Florida Workers' Compensation System. This right, however, is contingent upon meeting a notice requirement contained in the statute; notice of the election not to procure a workers' compensation insurance policy (in which case the doctrine of exclusive remedy does not apply) must be posted in a conspicuous location in the business. This requirement assures that regular employees are well-aware of this election. From a practical standpoint,

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[1] Under Section 440.02 of the Florida Workers' Compensation Statute, "'[e]mployee' means any person [Miguel Angel Gonzalez Huicochea] who receives remuneration from an employer [Los Cunados Grocery Store] for the performance of any work or service while engaged in any 'employment' [as defined under the Florida Workers' Compensation Statute] …"

this requirement is met so long as this election is not "hidden" from regular employees; they must be well-aware of this election.

**Does The "Workers' Compensation And Similar Laws" Exclusion Apply?**

This exclusion stipulates that the Commercial General Liability (CGL) Policy does not apply to "[a]ny obligation of the insured under a Workers' Compensation . . . Law or any Similar Law." In the illustrative case, notwithstanding the fact that Miguel Angel Gonzalez Huicochea qualified as an "employee," per the definition contained under the Florida Workers' Compensation Statute, this exclusion is inapplicable because Los Cunados Grocery Store had no legal obligation under the Florida Workers' Compensation Statute. Such is the case because the owner (1) rightfully opted out of the Workers' Compensation System-the store regularly employed only two people, and (2) put regular employees on notice concerning this election. Most importantly, given that Los Cunados Grocery Store was exempt under the Florida Workers' Compensation Statute, it had no obligation under a Workers' Compensation Law to pay a statutory death benefit to the Estate of Miguel Angel Gonzalez Huicochea. Furthermore, the intent of the parties to the contract in placing this exclusion in the Commercial General Liability (CGL) Policy is to avoid unnecessary duplication of coverage under both a workers' compensation insurance policy, and the Commercial General Liability (CGL) Policy. Where an employer has rightfully elected not to procure a workers' compensation insurance policy, coverage under the Commercial General Liability (CGL) Policy for this exposure to loss does not result in unnecessary duplication of coverage.

**Does The "Employer's Liability" Exclusion Apply?**

This exclusion stipulates that the Commercial General Liability (CGL) Policy does not apply to "'[b]odily injury' [including death resulting therefrom] to: (1) [a]n 'employee' of the insured arising out of and in the course of: (a) [e]mployment by the insured; or (b) [p]erforming duties related to the conduct of the insured's business . . .." In the illustrative case, notwithstanding the fact that Miguel Angel Gonzalez Huicochea (1) qualified as an "employee," as defined under the Florida Workers' Compensation Statute, (2) was working at the grocery store at the time of the incident that resulted in his untimely death, (3) died while performing duties that arose out of and in the course of employment by Los Cunados Grocery Store, and (4) died while performing duties related to the conduct of Los Cunados Grocery Store's business, this exclusion arguably is inapplicable. A case can be made that Miguel Angel Gonzalez Huicochea does not qualify as an "employee" as defined in the Commercial General Liability (CGL) Policy. A "temporary worker" does not qualify as an "employee." "'Temporary worker' means a person [Miguel Angel Gonzalez Huicochea] who is furnished to you [Los Cunados Grocery Store] . . . to meet seasonal or short-term workload conditions." Miguel Angel Gonzalez Huicochea (1) did not have regular hours, but rather worked at the grocery store on a sporadic basis, (2) did not have regular assigned duties when he did work at the store, but rather performed whatever odd jobs that needed to be done at the moment, (3) did not receive an agreed upon wage when he did work, but rather a barter system was in place (i.e., he received food items in exchange for work), (4) was not on the payroll and, thus, social security taxes were not withheld when he did receive cash in exchange for work (i.e., he was strictly paid "under the table"), (5) did not have a formal agreement with the owner concerning the terms of his employment, and (6) was not subject to any sort of formal or informal performance evaluation.

The intent of the parties to the contract in inserting this exclusion into the Commercial General Liability (CGL) Policy was to only exclude coverage for an exposure to loss that is meant to be insured under what commonly is referred to as "stopgap coverage." The custom and practice is to exclude coverage under the Commercial General Liability (CGL) Policy for a significant exposure to loss where a specialty insurance policy has been designed to provide coverage for this significant exposure to loss. "Stopgap coverage" addresses an exception that is contained under the Florida Workers' Compensation Statute. Under Section 440.11 of this statute, exclusive liability does not apply in those cases where an employer commits an intentional tort that causes the injury or death of the employee. An employer's actions are deemed to constitute an intentional tort because the conduct of the employer was so reckless that an intent to injure the employee can be inferred from the employer's conduct-it was not an accident. In cases involving industrial employers where (1) the conditions in the workplace are inherently dangerous, and (2) the implementation of safety precautions is of paramount

importance, an injured employee is likely to allege an intentional tort. For this reason, industrial employers usually purchase "stopgap coverage." The "Employer's Liability" exclusion in the Commercial General Liability (CGL) Policy precludes unnecessary duplication of coverage. By including an exception for a "temporary worker," however, an employer in a light hazard industry is not forced to purchase "stopgap coverage," and, thereby, subsidize the cost of this coverage for industrial employers. In providing limited employer's liability coverage under the Commercial General Liability (CGL) Policy, the intent is to cover an incidental exposure to loss related to the occasional employment of a temporary worker who fills in for a very short period of time because (1) a regular employee, for example, is on maternity leave, or (2) the workload for a very short period of time is too heavy for the permanent employees to handle by themselves (e.g., a very small retailer hires a temporary worker during the Christmas holiday season).

While the trial court ruled in the illustrative case that Miguel Angel Gonzalez Huicochea qualified as a "temporary worker" and, therefore, the "Employer's Liability" exclusion did not apply, in another jurisdiction, the ruling may well have been different. While the Commercial General Liability (CGL) Policy is silent in terms of who must furnish the temporary worker to the employer, a case can be made that someone (such as an employment agency, or a regular employee of the business) must refer the worker to the employer for this worker to qualify as a "temporary worker." Indeed, most of the jurisdictions have held that the phrase "furnished to" in the definition of "temporary worker" unambiguously requires the involvement of a third party, such as a temporary staffing agency, that supplies the worker to the insured employer [2]. In the illustrative case, Miguel Angel Gonzalez Huicochea referred himself to the owner of the grocery store. An informal relationship between these two individuals was developed over a period of time based on Mr. Huicochea's frequent presence at the grocery store (he frequently spent time at the grocery store), which eventually led to the owner asking him to work at the grocery store on those infrequent occasions when the owner was required to attend to a personal, or business matter, unrelated to the day-to-day operation of the grocery store. Clearly, in most jurisdictions, the trial court would have held as a matter of law that Mr. Huicochea did not qualify as a "temporary worker."

Furthermore, even if a jurisdiction embraces the notion that the term "furnish to," which is not defined in the Commercial General Liability (CGL) Policy, is ambiguous, or unambiguously does not require the involvement of a third party, determining whether a temporary worker was hired "to meet . . . short-term workload conditions" can be problematic. In the illustrative case, the relationship between the owner and Mr. Huicochea was indefinite, open-ended, and part of the ordinary course of the owner's business; Mr. Huicochea was not hired for a brief, finite period, or to perform a special project. In other words, the relationship between these two individuals was ongoing and, at any given moment in time, well into the future, the owner might ask Mr. Huicochea to work at the grocery store. On this basis, a trial court could easily conclude as a matter of law that Mr. Huicochea was not hired "to meet . . . short-term workload conditions," and, therefore, he did not qualify as a "temporary worker"[3]

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[2]See e.g., *General Agents Ins. Co. v. Mandrill Corp*., 243 Fed.Appx 961 (6th Cir. 2007); *Nationwide Mut. Ins. Co. v. Allen*, 83 Conn.App. 526, 850 A.2d 1047 (2004).

[3]. For a discussion of the sort of issues that can arise in determining whether a worker was hired "to meet… short-term workload conditions," see e.g., *Scottsdale Ins. Co. v. Carrabassett Trading Co*., 460 F.Supp.2d 251 (D.Mass. 2006).

## CONCLUSION

In the illustrative case, the family of Mr. Huicochea received compensation for his work-related death, notwithstanding the lack of worker compensation insurance[4]. Assuming a small employer (1) opts out of the worker compensation system, and (2) meets the notice requirement concerning this election, the doctrine of exclusive remedy does not apply. A temporary employee can file a tort lawsuit against the small employer on account of a work-related injury. Various defenses, however, may be available to the small employer. In the absence of legal liability on the part of the small employer in the underlying case, compensation for the temporary employee is precluded. Assuming that legal liability is clear in the underlying case, the legal claim against the small employer fits within the applicable insurance agreement contained in the Commercial General Liability (CGL) Policy. Also, the "Workers' Compensation and Similar Laws" exclusion is inapplicable. The "Employer's Liability" exclusion, however, may preclude coverage. First, trial courts in most jurisdictions have held that this exclusion applies unless the temporary worker was supplied by an employment agency. Second, the issue concerning whether a temporary worker was hired to meet short-term workload conditions can be problematic. Arguments likely can be crafted by an insurer suggesting that this requirement is not met, in which case the exclusion applies. This issue is inherently factual, and an employer is unlikely to prevail as a matter of law. In short, whether a temporary worker would be compensated for a work-related injury remains uncertain, for the reasons discussed in this teaching case study.

This illustrative case clearly demonstrates that a claim representative must first apply the plain text of the policy to the specific facts of the claim. Simply taking large "chunks" of policy language and putting it in quotes in a formal claim denial letter is insufficient. Coverage issues must be clearly identified, legal concepts must be applied in evaluating the underlying case, and legal precedent must be researched and applied to the facts connected to the claim. In short, whether a temporary worker would be compensated for a work-related injury remains uncertain, for the reasons discussed in this teaching case study.

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[4]. A confidential settlement was reached between the CGL insurer (Granada Insurance Company) and the family.

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# Evolving Threats at Educational Institutions: Integrating Terror Risk into Risk Management and Insurance Education

Emily Norman Zietz

Middle Tennessee State University

**Abstract**

Targeted violence and shootings at educational institutions have escalated in both frequency and general severity since the mid-20th century. Creating a safe environment for students, both children and adults at colleges and universities, is the responsibility of many partners, including the school staff, various law enforcement entities, parents, mental health and medical professionals, and often the public in general. This paper reviews the most deadly and widely-publicized incidents from 1966 through 2025, identifying trends in offender characteristics, methods of attack, and victim outcomes. The evidence illustrates a disturbing pattern of attacks including an increase in both frequency and the proportion of younger perpetrators. This pattern highlights the need for safeguards and risk management initiatives at all levels of the education sector. Recommended approaches include the need to teach and enforce stronger threat assessment procedures, enhanced crisis response training, improved access control to previously open or unguarded venues, expanded mental health support, education on SAFETY Act protection, and better-defined accountability measures.

## INTRODUCTION

Universities and schools, traditionally considered safe spaces for learning, have increasingly become targets of mass violence. The first widely-publicized case of a school shooting in the U.S. occurred at the University of Texas in 1966, when a student opened fire from a tower on campus and killed 18 people, including two family members earlier in the day (Lavergne, 2017). Thirty additional people were injured. Since that time, hundreds of attacks have occurred at both K-12 and higher education institutions, collectively more than 200 people and injuring many others. The National Center for Education Statistics reports that from 2000 through 2022 there were 206 fatalities in active shooter incidents in K-12 and post-secondary institutions, and another 279 injuries were inflicted in these attacks (National Center for Education Statistics, 2024). These tragic incidents highlight the need to reassess campus safety through the lens of risk management education.

The purpose of this paper is to analyze the growing risk of terror threats in educational environments using documented incidents to emphasize the importance of adopting evolving risk management strategies and techniques to mitigate both the likelihood and impact of future attacks. It is hoped that the results of this study will encourage risk management and insurance programs at universities to incorporate specific techniques in their curricula that address the unique environment of academia that creates an attractive target for bad actors who wish to inflict harm on innocent people at schools.

## HISTORICAL CONTEXT AND LITERATURE

Existing news reports on terror threats at schools identify several recurring themes in school-based attacks: perpetrators are often current or former students, warning signs frequently precede incidents, and firearms are the most common weapon. The Columbine High School attack in 1999 is often cited as the turning

point, introducing a model of coordinated planning and mass casualties that may have inspired subsequent attackers.

Few academic studies have addressed the risk of terror threat at educational institutions but results have been interesting. Dai, Zhang, and Kafle (2024) examine patterns of U.S. school shootings from 1999–2024 using game theory models and machine learning. Findings show that mass school shootings typically last about 31 minutes consisting of four distinct phases and most often occur inside classrooms and hallways. The annual probability of such an event is estimated at 1 in 81,604 per school. Analysis from this study suggests that the number of mass school shootings declined during the COVID-19 period and may continue to decrease but may not decrease in lethality. The results provide statistical insights to aid law enforcement, schools' safety professionals, risk managers, and other partners in prevention efforts, with supporting datasets available online. The study further highlights the lack of academic research that specifically focuses on mass school shootings and addresses this gap by applying game theory, probability analysis, and incident timelines. The findings, including a 5-year prediction of future events, provide insights to help law enforcement develop better preparedness and prevention strategies.

Universities, colleges, and K-12 schools are considered especially vulnerable to acts of terror or violence for myriad reasons. These places are considered soft targets in that they have symbolic value and are generally unguarded areas in which large numbers of people congregate (Petkova, Martinez, Schlegelmilch, and Redlener, 2016). This study notes that school environments are especially vulnerable to attacks as they provide an opportunity for a terrorist or bad actor to achieve media attention and bring sympathetic attention to a particular cause. Additionally, attacks against children can distort the public's confidence in a government's ability to protect its most precious asset.

Another study examines the vulnerabilities of school environments as being soft targets for acts of terror and violence (Bradford and Wilson, 2013). This study reports several reasons terrorists choose to target educational institutions, including the devastating impact an attack can cause on people and property, the level of intimidation it can evoke, and the powerfully symbolic and emotional response it will receive from the public. This study further reports that myriad types of terror attacks have occurred on educational institutions around the world, including active shooting and armed assaults, bombings, hostage taking, chemical attacks, and arson-based attacks. The most frequent type of attacks at schools involves armed assaults. Attacking schools and children, which are often considered a population's most vulnerable demographic, may also create a message that the government is incompetent.

A U.S. Department of Homeland Security report that examines risk factors involving violence in schools highlights some relevant statistics on terror risk. (U.S. Department of Homeland Security, 2024). This report describes several potential risk factors and common indicators of individuals who had executed attacks at schools. Key risk factors about perpetrators noted in this study include the following:

- 94% of attackers had a common "home life factor" such as parental divorce/separation (71%); family financial problems (69%); family member incarcerated (54%); parent/sibling substance abuse (46%); domestic violence/abuse (40%); or other factors such as family mental health issues, abuse or neglect, or non-parental custodial care;
- 91% of attackers had observable psychological (such as depression, suicidal ideas, anger, or psychotic symptoms), behavioral (such as defiance, poor impulse control, violation of social norms), or neurological (such as developmental delays, cognitive deficits) symptoms.
- 83% of attackers threatened others or communicated their intent to execute an attack;
- 83% of attackers were retaliating for a grievance;
- 80% of attackers were bullied by a classmate;
- 74% of attackers showed signs of frequent anger;

- 63% of attackers showed signs of severe depression, sadness, or isolation;
- 51% of attackers had engaged in observable planning behaviors prior to the attack.

This study further reports that 100 percent school attackers had experienced at least one social risk factor such as bullying or problems with a romantic partner within six months of their attack. Being aware of whether a student has demonstrated any of the above factors indicates a need for further threat assessment and management to prevent a potential threat from escalating.

Providing adequate anti-terrorism security at soft targets such as school facilities is also addressed in a study using data from the Czech Republic (Hoskova-Mayerova, Bekesine, and Benova, 2021). This study describes soft targets as having high population concentration and low or even no level of security against violent attacks. One of the most important and easily vulnerable soft targets are schools. This study finds that while many schools have basic security initiatives in their campus infrastructure, there is a need for systemic and organizational measures for these locations to be sufficiently secure.

## ANALYSIS AND REVIEW OF ATTACKS

Table 1 provides a list of more deadly and highly publicized attacks that have occurred at universities, colleges, and K-12 schools in the U.S. since 1966. These attacks occurred from 1966 to 2025 and include 31 attack incidents. The table includes the year of the attack, school, location, the type of weapon used, a brief description of the attack, and the outcome of the perpetrator.

TABLE 1. SUMMARY OF TERROR ATTACKS AT EDUCATIONAL INSTITUTIONS.

| Date | City/State | School or University | Number of Deaths | Number of Injuries | Weapon | Outcome of Attacker | Description |
|---|---|---|---|---|---|---|---|
| 1966 | Austin, TX | University of Texas | 18 | 30 | gun | Shot by Law Enforcement | A student and former Marine opened fire from a clock tower on campus after having killed his wife and mother earlier in the day; he was shot by police officers |
| 1976 | Fullerton, CA | California State University, Fullerton | 7 | 2 | gun | Deemed Incompetent | A janitor at Cal State Fullerton entered the university's library going on a shooting spree on various floors, killing faculty and staff, all employees of the university; the shooter was arrested later that day and was said to have been depressed due to family problems before the shooting. |
| 1989 | Stockton, CA | Cleveland Elementary School | 6 | 29 | gun and bayonet | Suicide | An active shooter with a gun and a bayonet opened fire on students and teachers on the school playground then killed himself; resulted in the school having a closed campus, with fencing and surveillance cameras later being installed. |
| 1998 | Jonesboro, AR | Westside Middle School | 5 | 10 | guns | Convicted | Two students, ages 13 and 11, pulled a fire alarm and ran to a wooded area; when students ran out of the building, the boys opened fire and killed four students and a teacher; they were tried in court as juveniles and were released at age 21. |
| 1998 | Springfield, OR | Thurston High School | 4 | 25 | gun | Convicted | A 15-year-old student who had a history of mental illness opened fire in the school cafeteria killing two classmates after having killed his parents at their home; The student confessed to the killings and was sentenced to more than 111 years in prison, without a chance of parole. |
| 1999 | Littleton, CO | Columbine High School | 15 | 27 | guns and bombs | Suicide | Two teenage students opened fire on students and teachers and used homemade bombs to execute an attack at the school. The shooters then committed suicide. |
| 2005 | Red Lake, MN | Red Lake Senior High School | 10 | 7 | guns | Suicide | A 16-year-old student killed his grandfather who was an Ojibwe tribal police sergeant and his girlfriend at home then used his grandfather's weapons and vest and killed seven people at the school before committing suicide. |
| 2006 | Nickel | West Nickel Mines Amish | 5 | 6 | gun | Suicide | A 33-year-old man entered one-room Amish school |

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| | Mines, PA | School | | | | | house, took hostages and shot 10 girls but five survived. The shooter then committed suicide. |
| 2007 | Blacksburg, VA | Virginia Polytechnic Institute | 32 | 26 | gun | Suicide | A 23-year-old senior student born in South Korea opened fire on faculty, staff, and other students on campus before committing suicide; he had previously been ordered by a judge to seek mental health care after making suicidal remarks to his roommates. |
| 2008 | DeKalb, IL | Northern Illinois University | 5 | 17 | gun | Suicide | A 27-year-old former graduate student opened fire in a lecture hall killing five students before committing suicide |
| 2012 | Oakland, CA | Oikos University | 7 | 3 | gun | Deemed Incompetent | A 43-year-old former student opened fire in a classroom and school killing students and a receptionist; the shooter was not convicted and was declared mentally incompetent to stand trial. |
| 2012 | Newton, CT | Sandy Hook Elementary School | 27 | 3 | guns | Suicide | A 20-year-old shooter opened fire at school killing 30 students, 6 staff members; the shooter then committed suicide. |
| 2014 | Santa Barbara, CA | Near University of CA Santa Barbara | 6 | 13 | gun | Suicide | A 22-year-old shooter opened fire outside a sorority house and a nearby deli in Isla Vista, near the University of California Santa Barbara campus. He died from apparent suicide. |
| 2014 | Marysville, WA | Marysville-Pilchuck High School | 4 | 3 | gun | Suicide | A 15-year-old student opened fire on his classmates in the school cafeteria before committing suicide; records indicated he was upset about a recent breakup and opened fire because he did not want to die alone; his father was convicted for illegally possessing firearms. |
| 2015 | Roseburg, OR | Umpqua Community College | 9 | 9 | guns | Suicide | A 26-year-old student opened fire in a classroom killing a professor and eight students; he then killed himself; the shooter left a manifesto that implied he had mental and emotional illnesses. |
| 2018 | Parkland, FL | Marjory Stoneman Douglas High School | 17 | 17 | guns | Convicted | A former student, age 19, who had been expelled for disciplinary issues, entered the school and opened fire on students and staff. He is serving 34 consecutive life sentences without the possibility of parole. |
| 2018 | Santa Fe, TX | Santa Fe High School | 10 | 14 | gun | Deemed Incompetent | A student, age 17, opened fired on students and staff; was charged with capital murder but was declared incompetent to stand trial and was being held in a mental |

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| | | | | | | | health facility; victims sought to hold the shooters parents of the shooter accountable for the shootings for failing to provide mental health care for their son but a jury did not find them guilty. |
| 2019 | Highlands Ranch, CO | STEM School Highlands Ranch | 1 | 8 | guns | Convicted | Two students, ages 16 and 18, entered the school with guns and weapons in a guitar case and backpack and opened fire on students; the 18-year old was convicted on 46 counts on various charges and faces life in prison without parole; the 16-year old pleaded guilty and was sentenced to life in prison possible parole in 38 years. |
| 2021 | Oxford, MI | Oxford High School | 4 | 7 | gun | Convicted | A 15-year-old student opened fire at school killing four students; he was sentenced to life in prison with parole and his parents were found guilty of involuntary manslaughter and were sentenced to a maximum of 15-years in prison with possible parole in 10 years. |
| 2022 | Uvalde, TX | Robb Elementary School | 22 | 18 | gun | Shot by Law Enforcement | A former student, age 18, opened fire on 19 students and 2 teachers after killing his grandmother at their home earlier; he was in the classroom 74 minutes before Border Patrol breached the classroom; he was killed by law enforcement |
| 2023 | Las Vegas, NV | University of Nevada, Las Vegas | 3 | 3 | gun | Shot by Law Enforcement | A 67-year-old college professor opened fire on faculty members; he was shot and killed by police, near the site of the Las Vegas Route 91 Harvest concert shooting occurred in 2017. |
| 2023 | Chapel Hill, NC | University of North Carolina | 1 | 0 | gun | Deemed Incompetent | A 34-year-old graduate student shot and killed an associate professor on campus; shooter has not been convicted as he was found unfit for trial due to mental health issues. |
| 2023 | Richmond, VA | Huguenot High School | 2 | 7 | guns | No Charges | Shortly after graduation ceremonies ended, a 19-year-old opened fire on an 18-year-old with whom he had a long-running dispute and his 36-year-old father, killing both and injuring several others. |
| 2023 | East Lansing, MI | Michigan State University | 3 | 5 | guns | Suicide | A 43-year-old shooter who had no apparent connection to the university or the victims, opened fire on students then shot himself. |
| 2023 | Nashville, TN | Covenant School | 6 | 2 | gun | Shot by Law Enforcement | A 28-year-old former student, and transgender man, killed three students and three teachers before being |

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| | | | | | | | killed by law enforcement. |
| 2024 | Perry, IA | Perry High School | 3 | 6 | gun | Suicide | A 17-year-old student shot students and staff before committing suicide; he also had a “rudimentary improvised explosive device that was not activated. |
| 2024 | Winder, GA | Apalachee High School | 4 | 9 | gun | Charged | A 14-year-old student opened fire on students and teachers; he was charged with four counts of felony murder, and his father was charged with second-degree murder and other charges. |
| 2024 | Madison, WI | Abundant Life Christian School | 2 | 6 | gun | Suicide | A 15-year-old student opened fire on students and teachers at the school; she then committed suicide; her father faces charges for intentionally giving her access to weapons and other charges. |
| 2025 | Nashville, TN | Antioch High School | 2 | 1 | gun | Suicide | A 17-year-old student opened fire in the school’s cafeteria killing a student before committing suicide. |
| 2025 | Dallas, TX | Wilmer-Hutchins High School | 0 | 5 | guns | Convicted | A 17-year old student walked through a side door and opened fire at school injuring 5 people; the shooter later turned himself in to police; one year earlier, a similar incident occurred as a student walked through metal detector with gun and was not checked; he injured one student in 2024. |
| 2025 | Tallahassee, FL | Florida State University | 2 | 7 | gun | In Custody | A 20-year-old student who was a “longstanding member” of the sheriff office’s youth advisory council and the stepson of a police officer, opened fire in the student union killing two people (non-students) and injuring others; he is currently in police custody. |

**Summary of attacks from 1966-2025**

- Escalating frequency in the number of attacks: The number of attacks increased significantly after the 1990s, with multiple incidents occurring in most years since 2018;
- High casualty events: Those attacks that resulted in the largest number of deaths included the attacks at Virginia Tech in 2007 with 32 fatalities: Sandy Hook in 2012 with 27 fatalities, and Uvalde in 2022 with 22 fatalities;
- Shooter Profile: Most attackers were young males who were either students or who had direct ties to the school, often facing mental health struggles or social alienation;
- Weapon Usage: Nearly all incidents involved firearms, with a small and growing number of cases including parental accountability charges, including the Oxford 2021 and Apalachee 2024 incidents;
- Shooter Outcomes: Many shooters committed suicide or were killed by police, although some were found unfit to stand trial or were tried and sentenced to life in prison.

Further illustrations of patterns of these attacks are provided in the three figures below. Figure 1 illustrates the number of attacks that have occurred per decade since the 1960s. This chart illustrates the sharp increase in the number of campus attacks in the 2000s. While incidents were sporadic before the 1990s, they have become increasingly frequent since 1998, with multiple deadly incidents most years since 2012. More recently, in years 2022-2025, there appears to be some incident clustering, suggesting the mass shooting attacks at schools have become a persistent societal risk rather than isolated anomalies.

Figure 1. Number of Attacks Per Decade.

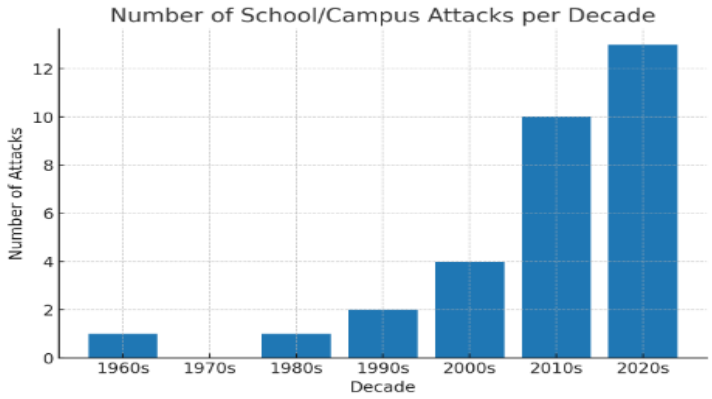
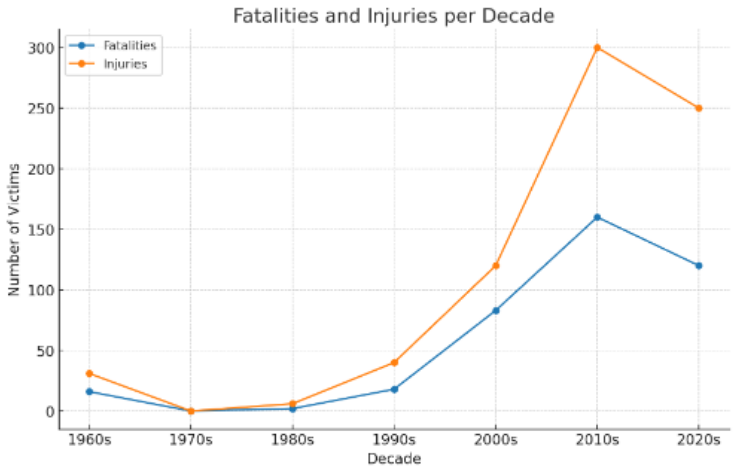


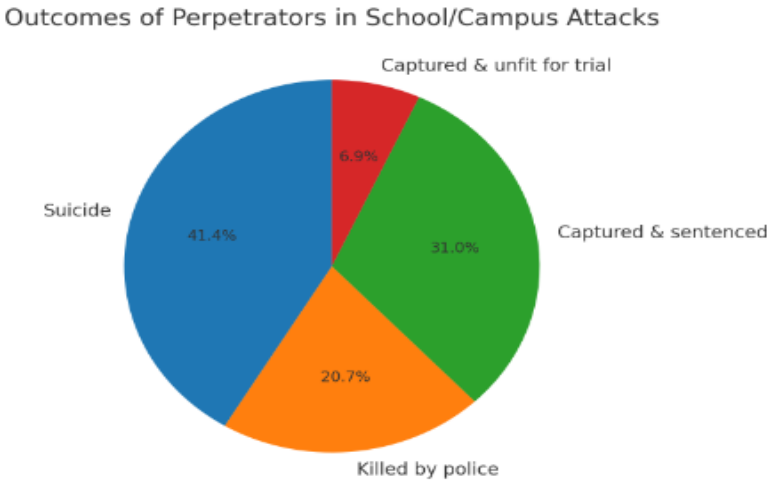

Figure 2 below provides a graph of the number of fatalities and injuries over the decades examined. There has been a sharp increase in school attacks in the most recent decades. **The numbers of** fatalities and injuries escalate significantly after the 1990s, reflecting the greater lethality of recent attacks.

Figure 2. Number of Fatalities and Injuries Per Decade.




The chart in figure 3 describes the outcomes of the attackers. The largest percentage of attackers committed suicide after attacking their victims, while others were either killed by police or captured. Only a small fraction were found unfit for trial.

Figure 3. Outcomes of Perpetrators.




## Other notable findings

Weapons used on school campuses tend to be firearms. However, as in the Columbine and Perry High School incidents, improvised explosive devices appear occasionally. Shooters often combine guns with other tactical activities or resources, including activating fire alarms, manifestos, or having knowledge of the school layout. The perpetrators of terror incidents at educational venues are generally students or former students, though there were several incidents in which the threats were initiated by an outsider, such as in the Nickel Mines Amish School and the Michigan State University attacks.

Legal accountability is also evolving, where parents and guardians are now being charged or held accountable for the actions of their children, either directly or indirectly. For example, in the Oxford and Madison, WI cases, parents were charged with various offenses, with differing outcomes in the court system.

There appears to be a growing trend for accountability to be placed on parents or guardians of minors, or those entities who provide resources and weapons to such minors, who commit major crimes.

Some of these incidents, as well as recent studies, highlight the failures in law enforcement responses, such as in the delay in law enforcement response in the Uvalde attack. The delayed response of law enforcement was widely condemned by numerous media reports. One U.S. Justice Department report notes that chaos and a "lack of urgency plagued the police response to this mass shooting while teachers and students were held up in a room with an active shooter for over an hour. (Drenon, 2024.) This report notes that while almost 400 officers responded to the school shooting, it took over an hour for the shooter to be contained as there were failures of leadership, decisions, and tactical and training measures that should have been in place before the incident occurred. Effective prevention requires a combination of behavioral threat assessment, physical security measures, and mental health interventions.

SAFETY Act

Following the attacks of 9/11, Congress established the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (the SAFETY Act), to provide a risk management framework that encourages the use of innovative and life-saving technologies. (Maher, 2024). The purpose of this Act is to ensure that entities are not discouraged from designing and deploying anti-terrorism products and services due to the exorbitant liability exposure that a product or service may create. The Act seeks to minimize the liability risks stemming from acts of terrorism, such as from active shooters, explosive devices, cyber-attacks and other means of terror. Companies that provide technologies that are intended to thwart or mitigate acts of terror may apply for a limit on the liability for which they may be held for the deployment of their product or service. Thus, a product that has received SAFETY Act protection has significant legal liability protection.

Organizations that use such protected products may also benefit from SAFETY Act protection. For example, assume a school or university installs a metal detector to screen people entering a secure area. If the company that provides the metal detector has applied for and received SAFETY Act protection for that technology, then the school or university could enjoy some of the limited liability protection granted through the SAFETY Act. This method of risk transfer and reduction helps in risk management efforts by providing a limit on the amount of liability for which an entity is responsible. It provides litigation management as the liability immunity extends to an entity that deploys the technology, and it also potentially provides insurance premium savings. Since there is a cap on the amount for which an entity may be legally responsible, insurance costs could be reduced as well.

**Other risk management considerations**

A fruitful area to address in risk management and insurance education is the process of institutional response to a potential terror attack. As noted in several cases, some incidents prompted direct security measure changes, such as constructing fences, surveillance, and closed campuses, as in the Stockton attack in 1989. Many schools now have security measures such as metal detectors and School Resource Officers, and other initiatives may need to be implemented.

The implications for risk management are multifaceted. First, prevention efforts must prioritize formal behavioral threat assessment processes that integrate multidisciplinary teams and confidential reporting mechanisms. Preparedness should include scenario-based lockdown drills, rapid-reunification protocols, and trauma-informed crisis training for staff. Physical security measures, including more diligent oversight of mechanisms including metal detectors and entry points surveillance, interior rapid-lockdown systems, and reliable mass-notification technologies, are critically important in protecting educational environments. Additionally, schools must address underlying psycho-social conditions by investing in mental health counseling, peer-support

systems, and reintegration strategies to reduce alienation and other behavioral and mental health risk factors. From a governance perspective, institutional policies on firearm storage, disciplinary response, and collaboration with law enforcement and risk managers must be strengthened, while insurance programs should be updated to reflect evolving risks.

## CONCLUSIONS

The alarming rise in the number of school attacks from 1966 to 2025 reflects a profound shift in the nature of threats facing educational institutions. What were once rare and isolated events have become more frequent, deadlier, and increasingly complex becoming more predictable incidents. This trend highlights the need for comprehensive risk management strategies that extend beyond physical security, risk control, and risk financing measures to include behavioral, social and systemic factors, as well as SAFETY Act protection when possible. By advancing risk management practices and fostering greater awareness of these vulnerabilities, future RMI professionals will be better prepared to address the evolving challenges within this critical area of risk.

Ultimately, attacks at educational institutions must be viewed not as rare anomalies but as persistent and evolving risks. The data illustrate clustering of attacks in recent years, the predominance of firearms as a weapon, and the vulnerability of school environments to targeted violence. For risk managers, the lessons are clear: reducing exposure requires an integrated approach that combines behavioral, physical, legal, and financial strategies. In academic and professional curricula, these findings reinforce the need to integrate terror risk into insurance and risk management education, ensuring that future practitioners are equipped to address the complex, multifaceted threats facing educational institutions today.

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