

The Costs of Dropping Out of School in Iowa

Data, Methods, and Use of the Spreadsheet Template

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The Costs of Dropping Out of School in Iowa:

Data, Methods, and Use of the Spreadsheet Template

Introduction

Twenty-six years ago, in the midst of mounting criticism of public schools from the business community and a rising dropout rate in Iowa, I collaborated with Dr. Ray Morley of the Iowa Department of Education on a research project to investigate (1) the costs of dropping out of school and (2) the productivity benefits of returning and graduating from an alternative school. Alternative schools provided a mechanism for ameliorating the dropout problem in that dropouts could “drop into” an alternative school with more flexibility to work at their own pace and, hopefully, eventually graduate. In the second part of the investigation, we surveyed then recent alternative school graduates to ascertain whether they were becoming productive citizens and workers. Productivity was determined through a collaborative process with leaders in business, labor, education, and state government in Iowa to include employment, volunteer activity, and postsecondary education, among other factors. In addition, a subsample of employed graduates were surveyed regarding their attendance, punctuality, quality of work, appearance, and other characteristics contributing to worker productivity. Their self-assessments were compared with their employers’ assessments of the graduates on these work characteristics (Veale, 1990 and Morley & Veale, 1990).

This report is an update of the first part of the aforementioned study, the costs of dropping out of school, as well as a discussion of the methodology used to compute these (quantitative) costs. In addition, an *Excel* (Microsoft, Inc.) spreadsheet template developed to perform the cost calculations is discussed in Appendix A, with specific references to cells where new data may be entered, as well as those containing calculated values and associated graphical displays.

The dropout rate in Iowa has been reduced and stabilized over the past two and one-half decades, except for increases in 2008-10 (Iowa Department of Education, 2015 and Xiaoping Wang, Iowa Department of Education, personal communication, 2015 and 2016).¹ (See Figure 1.) However, the *costs* of dropping out have, in some cases, increased.

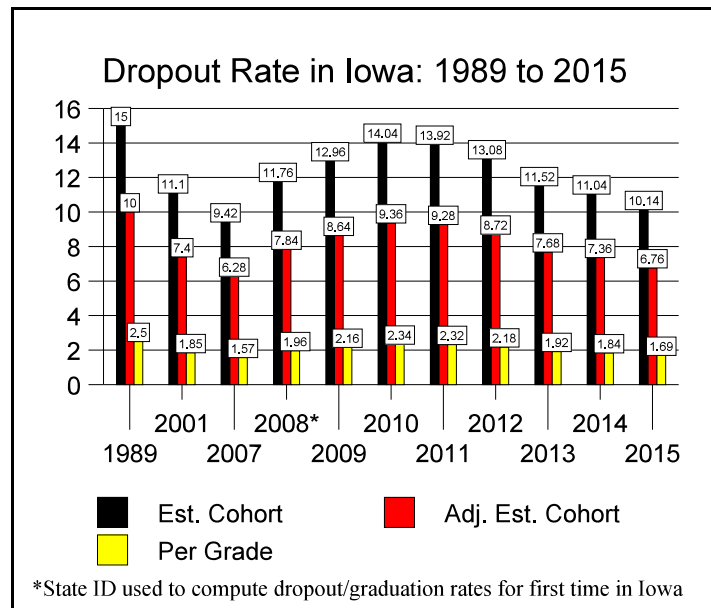


Figure 1: Dropout rates in Iowa from 1989 to 2015.

¹ In the figure, the “estimated cohort” rate is the estimated dropout rate for all six grades 7-12 ($= 6 \times$ per grade rate). The “adjusted estimated cohort” is the estimated cohort rate adjusted for those expected to return and graduate ($= (2/3) \times$ cohort rate). The increases in 2008-10 may have been primarily due to the impact of the use of State IDs in Iowa for improved tracking of students.

The dropout rates in Figure 1 are (1) per grade rate, (2) cohort rate, and (3) adjusted cohort rate. The per grade rate is based on grades 7-12, since dropouts occur in each of these grades. This rate is also referred to as an “event” or “annual” rate. This rate is reported by the Iowa Department of Education in its annual “Condition of Education” report. It has been calculated in the same way for decades, but only since about 2008 using State ID numbers to track dropouts. The cohort rate is obtained by taking the per grade rate and multiplying by the number of grades on which it is based (6). The cohort rate may be considered more meaningful than the per grade or event rate, since it provides an estimate of the percent of a class or cohort that drops out *sometime* during their six years of junior/senior high school (grades 7-12). However, since some dropouts return the next year, it is felt that this overestimates the true cohort rate and an adjustment was needed. Based on experience with the dropout problem in Iowa, this was estimated to be about 1/3 of the cohort rate, which is subtracted from the cohort yielding the adjusted cohort rate (Raymond Morley, personal communication, 1990). Graduation rates are computed based on a formula for the four-year cohort rate (Iowa Department of Education, 2014). Iowa led the nation in 2014 with a 90.5% graduation rate (Xiaoping Wang, Iowa Department of Education, personal communication, 2015). In 2015, Iowa’s graduation rate increased to 90.8%.

It is also important to examine the dropout and graduation rates for subgroups, such as those with various disabilities or by race/ethnicity (e.g., Lehr, Clapper, & Thurlow, 2005). For example, in Iowa in 2014, the annual (per grade) dropout rate for African-Americans in grades 7-12 was 4.93%, a slight increase (worsening) from that of the previous year (4.65%). The graduation rate for African-Americans was 78.6%, an increase (improvement) from that of the previous year (73.8%) (Xiaoping Wang, Iowa Department of Education, personal communication, 2015). These results may seem contradictory, but can be explained by the difference in how graduation and dropout rates are calculated. The dropout rate focuses on the *previous year only* and includes in its numerator all dropouts in all six grades (7-12). The graduation rate focuses on the cohort group represented in the *previous four years*; non-graduates are those who drop out in the previous year (or in the first three of the cohort’s four years of high school) as well as those who do not complete the graduation requirements in the four year period. Thus, the dropout rate may be considered a better measure for focusing resources on certain subgroups, based on the most recent data on dropouts in various grades (7-12).²

Definition of a School Dropout in Iowa

The National Center for Education Statistics (NCES) definitions used for dropouts include students who satisfy one or more of the following conditions:

- Was enrolled in school at some time during the previous school year and was not enrolled by October 1 of the current year or
- Was enrolled in school at some time during the previous school year and left the school before the previous summer and

² In the Iowa dropout data for African-Americans, it should be noted that the dropout rate for 2013 was considerably lower than their dropout rates in 2012 (6.06%) and 2011 (5.85%). The 2014 dropout rate is still lower than that of 2012 and 2011, so the increase over that of 2013 may not be an indication of significant worsening by students in this subgroup, indicating some consistency with the graduation rates for them. However, African-Americans continue to have the highest dropout rate of *all* race/ethnicity subgroups and, thus, dropout prevention program resources should perhaps be focused on students in this subgroup to hopefully reduce it.

- Has not graduated from high school or completed a state or district-approved educational program; and
- Does not meet any of the following exclusionary conditions: (a) transfer to another public school district, private school, or state or district-approved educational program, (b) temporary school-recognized absence for suspension or illness, (c) death, or (d) move out of the state or leave the country.

A student who has left the regular program to attend an adult program designed to earn a General Educational Development (GED) or High School Equivalency Diploma (HSED) is considered a dropout. However, a student who enrolls in an alternative school or alternative program administered by a public school district is *not* considered a dropout.

Costs of Dropping Out of School

The costs—to society, business, and the individual—of dropping out of school are many and varied. These costs include behavioral and human qualities as well as economic variables such as income, revenue, public assistance, and penal system involvement. More specifically, the five cost factors considered in the 1990 study are the following:

1. Reduction in personal income and loss in state revenue
2. Increase in the welfare burden due to higher unemployment rates (among dropouts)
3. Increased risk of incarceration
4. Deceleration in human growth and potential
5. Reduced sense of control over one's life

(Veale, 1990).

The first three of these are *quantitative* and numeric estimates of the amount of such costs are provided; the last two of these are *qualitative* and descriptive assessments of these costs are presented. We updated these estimates/assessments using the most current data available in the last quarter of 2015. In addition, a cost-benefit analysis conducted for the Iowa Legislative Services Agency (Prouty, 2004) has been updated using the most current data available.

Cost Factor 1: The Reduction in Personal Income and Loss in State Revenue

The research literature provides estimates of the personal income sacrificed (in part) by dropping out of school. Based on the most recent American Community Survey five-year estimates for Iowa (2014), median personal incomes for dropouts, high school graduates (including GED/HSED earners), and those with various levels of college education are as follows:

- Dropouts: \$22,288
- High school graduates (including GED/HSEDs): \$28,792
- Some college or graduates with an Associate Arts (AA) degree: \$33,606
- Graduates with a Bachelor of Arts or Science (BA or BS) degree: \$45,905
- Graduates with an advanced or professional degree: \$60,397
- All working Iowans (overall): \$35,251

(Gary Krob, Iowa Data Center and Library Services). (See Figure 2.)

Estimated Reduction in Personal Income

The overall average income for all working Iowans, \$35,251, may be used as a basis for comparison, since many high school graduates attend college and many of these attain college degrees. Subtracting the median income for dropouts (\$22,288) and multiplying by 45, one obtains an estimate of the personal income over a working lifetime that is sacrificed (in part) by dropping out of school compared with all working Iowans. This yields

$$(\$35,251 - \$22,288) \times 45$$

or \$583,335. Thus, dropouts sacrificed about 37% of their lifetime income, compared to that of all working Iowans. Since dropouts' incomes are included in the income for all working Iowans, this result should be conservative. Compared to the median income for high school graduates and those earning a GED or HSED (but no college), the amount of lifetime income sacrificed by dropping out of school is \$292,680.

The following interpretation of the above results was provided by Del Holland, formerly of Metro High School in Cedar Rapids (using the most current figures):

Students take about 5 course-hours per year, which yields 5×180 days or about 900 hours of school per year. This translates to about 4×900 or 3,600 hours for the four years of high school. The difference between the HS graduate (or GED/HSED earner) and dropout personal income (\$28,792 - \$22,288 or \$6,504) multiplied by 45 years is \$292,680. Dividing this by 3,600 hours yields about \$81/hr. This may be viewed as the value of achieving the high school diploma in hourly wages. Since the diploma (including a GED/HSED) may be considered a gateway to further (postsecondary) education, comparing dropout income to that of *all working Iowans* may be more valid for measuring the value of the high school diploma. This comparison yields about \$162/hr. Contrast these hourly rates to \$7-8/hr for a typical high school student job. While often beneficial and sometimes necessary, high school jobs can also cause some students to skip class and get behind in their school work. Absenteeism can lead to dropping out of school and forfeiting the aforementioned income gains over their lifetime.

Thus, based on the estimated amount of time students spend in high school and the estimated increase in personal income for graduates over that of dropouts, *a high school diploma is worth between \$81/hr (for graduates with no college) and \$162/hr (for all working Iowans), when viewed over a 45 year working lifetime* (Del Holland, personal communication, 2002).

Estimated Loss in State Revenue Due to Dropouts' Reduction in Personal Income

The income tax corresponding to the median gross income for Iowa dropouts of \$22,288 is estimated to be about \$612. The income tax corresponding to the median gross income for all working Iowans (overall) of \$35,251 is estimated to be about \$1,273 (Department of Revenue and

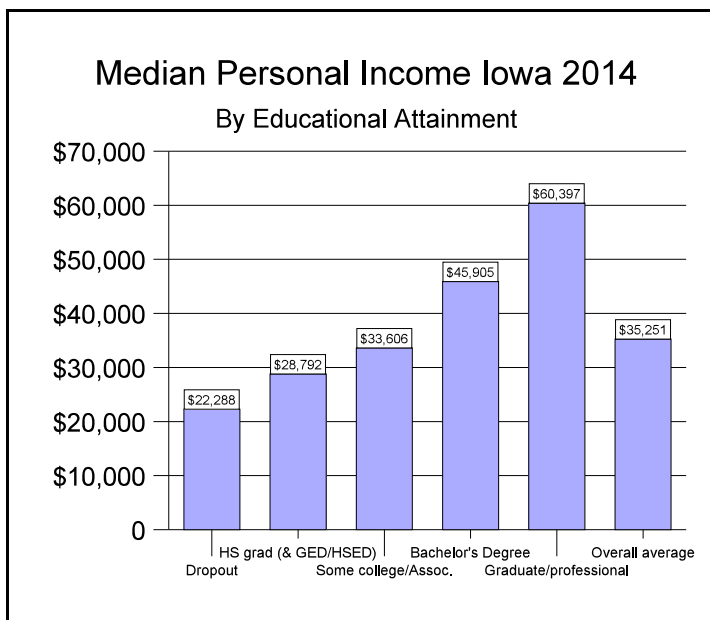


Figure 2: Median personal income in Iowa for 2014, by educational attainment.

Finance, personal communication, 2013).³ Another significant form of revenue is the state sales tax, about 6% of roughly 30% of personal income that is subject to sales tax.

The number of dropouts in Iowa in 2014 was 4,004. Many of these may eventually earn a high school equivalency (GED or HSED).⁴ The most recent data available on numbers of GEDs is for 2013, during which there were 848 persons between the ages of 16 and 18 who earned a GED (Amy Vybiral and Xiaoping Wang, Iowa Department of Education, personal communication, August 2015). It is assumed that these GED earners were dropouts, so the number of 2014 dropouts who did *not* earn a GED (or HSED) was estimated to be 3,156 (= 4,004 - 848). The loss to the state treasury which could be attributed to the reduced revenue payments of these 3,156 dropouts in Iowa in 2014, is therefore the sum of the estimates of income tax and sales tax differences for graduates and dropouts, multiplied by the number of dropouts who did not earn a GED or HSED, i.e.,

$$(1) \quad (3,156)\{(\$1,273 - \$612) + (\$35,251 - \$22,288) \times 30\% \times .06\}$$

or about \$2,822,032 per year.⁵ Over the working lifetime (about 45 years) of the average dropout and graduate, this loss to the state treasury becomes

$$(2) \quad (45) (\$2,822,031.58)$$

or \$126,991,421—about \$127.0 million.⁶ This represents an *annual* loss to the state treasury of about \$2.8 million.

Estimated Potential Revenue Enhancement if Dropouts Return and Graduate

The above figure may be viewed as the *potential increase* to the state treasury if all 2014 non-GED/HSED dropouts were educated to high school completion. This revenue enhancement would not come without a price tag. The “regular” state cost to educate a pupil for the 2015 year was \$6,366 (Iowa Department of Education, 2014). Based on dropout figures for the state of Iowa, broken down by grade level (year the person dropped out), the average dropout would need about 2.2 years of additional schooling to graduate.⁷ Using these figures, the estimated regular cost to educate all 3,156 non-GED/HSED dropouts in Iowa in 2014 to high school completion is

³ These were 2012 estimates obtained from the Iowa Department of Revenue, adjusted for increases in income for dropouts and all working Iowans based on 2014 income data.

⁴ GEDs were officially replaced in Iowa as of 2014 by the High School Equivalency Diploma (HSED), employing a somewhat different test. However, the GED test is provided by a private testing company in Iowa and some businesses are still accepting them as a high school “equivalency” (Xiaoping Wang, personal communication, 2016).

⁵ Additional decimal places were used for greater accuracy in this calculation involving large multiplicands.

⁶ It may be argued that not all of the above loss in personal income (and state revenue) is due to the educational status of the individuals concerned, namely that of “dropout.” It may be due to other factors such as ability, socioeconomic status (SES), race, etc. Regarding the ability factor, high school graduates, especially if they continue with postsecondary education, should have higher ability or skill levels than non-graduates. The effects of SES and race may be more difficult to overcome—due to discrimination which still exists to some degree, as well as cultural differences regarding the value of education. Finally, the assumption of a constant difference in income/revenue over the 45 year period may be questioned. More of these dropouts will probably earn their GED/HSEs in the future, making them more marketable. The incomes will rise over time, but based on the last few decades, much of this will be due to inflation.

⁷ This number is based on data from the Iowa Department of Education in 2000-01. This number changed only slightly from the value available in an earlier study (Veale, 1990) and is assumed to be fairly constant over time.

(3) (3,156) (2.2) (\$6,366)

or \$44,200,411—about \$44.2 million. This would be a “one time” cost to the state for these dropouts. The “total” state cost (including special education, dropout prevention, at-risk programs, etc.) was \$10,247 (Iowa Department of Education, 2014), which yielded an estimated total cost to educate the dropouts of \$71,146,970—about \$71.1 million.

The potential *net* increase to the state treasury, accumulated over the lifetime of the dropout-turned-graduate would therefore be the difference between the quantities (2) and (3):

(4) \$126,991,421 - \$44,200,411

or \$82,791,010—about \$82.8 million, or \$1.8 million per year, using the “regular” state cost figure. Using the “total” state cost figure, the potential net increase to the state treasury would be \$55,844,451—about \$55.8 million, or \$1.2 million per year.

This estimated net increase to the state treasury is the net gain due to educating *all* of the previous year’s dropouts to high school completion. It is probably unrealistic to assume that any program(s) to educate all such dropouts to high school completion would be 100% successful. However, even if they were only 50% successful (assuming the same one-time state cost for education), this would result in a sizable net gain for the state treasury. Moreover, it would surely result in other types of savings, such as reduced welfare dependency, reduction in number and severity of crimes, as well as gains in revenue from increased productivity. (See Cost Factors 2-5.)

Cost Factor 2: The Increase in the Welfare Burden

The second type of cost factor is that of the increased welfare burden due to dropping out of school. Iowa’s unemployment rate was 5.55% for high school graduates (including those with GED/HSEDs) and 10.73% for dropouts in 2014 (Gary Krob, Iowa Data Center and Library Services). These rates are based on the number in the labor force (of age 25-64 years) within each educational attainment group. If those not in the labor force (age 25-64 years) are included and the rates are based on the total number in each category, the unemployment rates would be 4.38% for high school graduates (including GED/HSEDs) and 7.15% for dropouts. (See Figure 3.) As with the revenue cost factor, it may be more accurate to compare dropouts to *all graduates*, including those with no college, some college/Associate Arts degree, and Bachelor’s degree or higher. The unemployment rates for this overall category of graduates are 3.84% (based on those in the labor force) and 3.23% (based on the total number in this category).

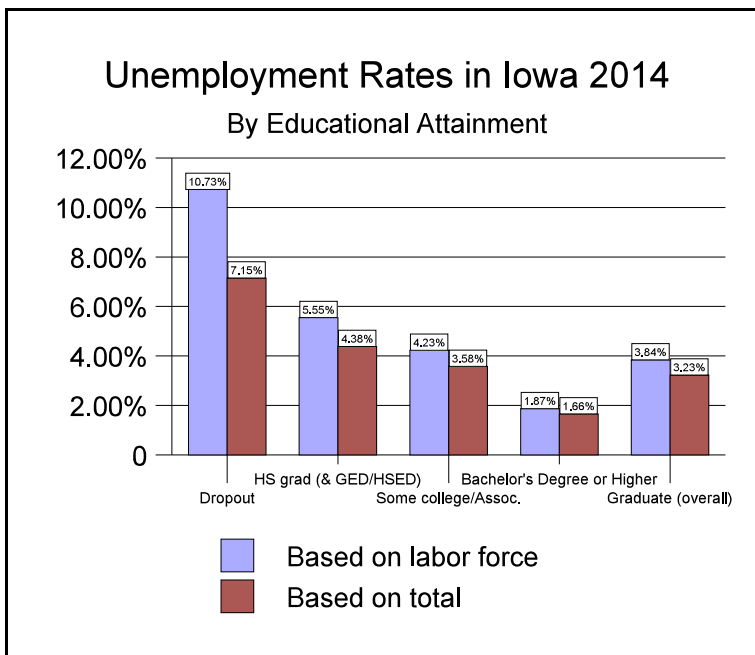


Figure 3: Unemployment rates in Iowa 2014: By educational attainment.

The estimated annual welfare payment in 2014 was \$10,802—\$1,310 for Food Assistance (“food stamps”), \$1,572 for Family Investment Program (FIP), and \$7,920 for Medicaid (ibid). The estimated cost of increased welfare payments for the 3,156 dropouts (estimated number who did not earn a GED or HSED) due to their increased level of unemployment in 2014 is:

$$(3,156) (.107314 - .038377) (\$10,801.92)$$

or about \$2.350 million per year.⁸ This assumes that unemployed dropouts are receiving all three types of public assistance payments. Note that this calculation utilizes the unemployment rates for dropouts and graduates (overall) based on the number of persons in the labor force in these education groups (age 25-64 years).

Some economic analysts maintain the real employment rate is much higher than the government’s “U-3” rate, based simply on the number of persons employed (full- or part-time) out of the number of persons considered to be in the labor force (e.g., the 5.55% rate for Iowa high school graduates, cited above). Based on an estimate of unutilized and unmonetized labor *hours* and assuming that employment constitutes a 40 hour week, the 2014 national time-based rate of unemployment was estimated to be as high as 42.9% (Stockman, 2015). This is related, in part, to the historically low national labor force participation rate—about 63% as of December 2014 (i.e., a 37% *nonparticipation* rate), which has been attributed to global labor market forces, government social welfare policy, and demographic factors.⁹ In addition, many of the new jobs added since the 2009 recession are part-time and some are connected with the so-called “sharing” or “access” economy (e.g., Uber and Lyft)—not traditional, full-time, *breadwinner* jobs, providing employees with benefits, opportunities for advancement, and pensions.

The labor force participation rate varies by states (Iowa was third *highest* in 2014) and by education level, among other factors. The labor force participation rate for Iowa dropouts in 2014 was 66.6%, obtained by taking the ratio of the number of dropouts in the labor force to the total number of dropouts available to work (expressed as a percent). For Iowa high school graduates, this rate was 79.0%, for those with some college or Associate Arts degrees it was 84.6%, and for our college graduates (Bachelor’s degree or higher) it was 88.8%. The overall (graduate) rate was 84.2%, obtained by taking a weighted average over the three categories of graduates. Dropouts who are *not* participating in the labor force are probably even more likely to be receiving welfare payments than those who are in the labor force but unemployed. These *nonparticipation* rates are 15.8% (= 100% - 84.2%) for graduates (overall) and 33.4% (= 100% - 66.6%) for dropouts. Thus, the estimated cost of increased welfare payments for the 3,156 non-GED/HSED dropouts due to their decreased level of participation in the labor force in 2014 is:

$$(3,156) (.3339026 - .1582171) (\$10,801.92)$$

⁸ Additional decimal places for unemployment rates and average annual benefits were used for greater accuracy in this calculation involving large multiplicands.

⁹ Global labor market forces include illegal or undocumented immigration and the off-shoring of jobs (use of “cheap labor”). Social welfare policies include those for the three types of welfare considered here, as well as the social security disability program. Regarding demographic factors, the oldest of 76 million “baby boomers” turned 65 about five years ago. Some of these older boomers who are pensioned and/or have sufficient savings/investments have been retired for a few years. However, many of them (as well as older members of the “silent generation” born during the depression up to the end of World War II) need to continue working, since they have not accumulated sufficient funds for retirement. Some have been unemployed for so long they have given up finding a job and gone on welfare or disability. These factors all contribute to the low rate of participation in the work force, which in turn, increases the welfare burden.

or about \$5.989 million per year.¹⁰ This assumes that dropouts not participating in the labor force are receiving all three forms of public assistance.

The increase in welfare payments due to unemployment could be combined with the above increase due to not participating in the labor force, but it would have to be recalculated using the same base for the rates—the *total number* in each education category (not just the number in the labor force in each category). This yields

$$(3,156) (.071482 - .032305) (\$10,801.92)$$

or about \$1.336 million per year. Combining the two cost estimates of increased welfare payments for dropouts, we obtain about \$7.325 million (= \$1.336 million + \$5.989 million) per year.

Of course, many of these nonparticipants in the labor force are homemakers engaged in productive (but unmonetized) work, as well as persons attending college¹¹ or some type of training program to hopefully become more marketable in the future, and retirees living on pensions. Others include social security disability recipients and those who have simply given up finding a job and have gone on some form(s) of welfare. The above estimate should thus be taken with a “grain of salt,” since we do not know the specific makeup of dropouts in terms of these and other categories. However, dropouts’ reduced labor force participation rate is indicative of *more serious, longer-term economic problems* for them, since it is not likely that more dropouts (than graduates) are working as homemakers, attending college, or entering into a secure and comfortable retirement with sufficient pensions, savings, and/or investment income.¹²

It is assumed that educating dropouts to high school completion would result in (1) a reduction in their unemployment rate and (2) an increase in their rate of participation in the labor force, relative to that of high school graduates in Iowa in 2014. This, in turn, should yield a reduction in the welfare burden. Thus, the above cost figure could be converted to a savings for the State of Iowa—and for Iowa taxpayers.

Cost Factor 3: Increased Risk of Incarceration

Dropouts are more likely than graduates to be in trouble with the authorities. The tenth most popular reason for dropping out of school, given by those who were motivated to return to an alternative school, was that “discipline and punishment were unfair to me” (Morley, 1989). About 43% of the dropouts who return to an alternative school in Iowa were apparently involved in disciplinary actions (which they felt were unfair) prior to dropping out of school (ibid.). The percentage involved in such disciplinary actions for dropouts who do *not* return to school might be assumed to have been even higher.

Such interactions with school authorities are indicative of a propensity for behavior which may later lead to incarceration. In Iowa in 2014, there were 1,533 inmates in adult corrections facilities with less than a high school education, out of a total of 3,952, excluding those with GED/HSEDs,

¹⁰ Additional decimal places for labor force nonparticipation rates and average annual benefits were used for greater accuracy in this calculation involving large multiplicands.

¹¹ Assuming the dropout later obtained a diploma or GED/HSED (required for admission to any college).

¹² A factor not taken into account in these calculations is the number of people receiving food stamps who are employed, but making so little income that they qualify for welfare (the “working poor”). Since, on the average, dropouts make less than graduates, they will be more likely (than graduates) to be receiving welfare *and* working. This factor would further add to the welfare burden due to dropping out.

classified as “secondary,” and those for whom their educational level was unknown (4,327) (Iowa Department of Corrections, 2015). Thus, the proportion of inmates who are dropouts out of the total number whose educational level is known (excluding GED/HSEDs) is 1,533/3,952 or 0.388. Here, GED/HSEDs were excluded from the calculations since some may have earned their equivalency diplomas while they were incarcerated.

By a conditional probability argument, assuming the estimated cohort dropout rate for the general population, it may be shown that the relative risk of incarceration among dropouts over that of graduates is equal to the odds of having dropped out of school among the incarcerated population divided by the odds of having dropped out among the general population. (See Appendix B.) This “odds ratio” may be shown to be equal to:

$$(.3879)/(.6121) \div (.1104)/(.8896)$$

or 5.11.¹³ Thus, *dropouts are over 5 times as likely to become incarcerated as graduates*. This assumes that the probability of dropping out among the general population in Iowa is 0.1104. This is the *cohort* dropout rate—the proportion of a cohort group dropping out of school sometime during the six year school period.

Using the *adjusted cohort* rate (two-thirds of the cohort rate) expressed as a proportion (0.0736), the relative risk of a dropout becoming incarcerated is 7.98, which is even greater than the previous estimate. Based on graduation rates now tracked in Iowa (90.5% in 2014), the true dropout rate is probably about midway between these estimates (Iowa Department of Education, 2014). Thus, the true increased risk of incarceration for dropouts is probably about midway between the corresponding estimates—about 6.5.

The above statistics on risk of incarceration are critical to any analysis of the costs of dropping out of school. The cost of incarceration for each inmate in Iowa in 2014 was \$93.61/day or about \$34,168/year. This is more than five times the 2013-14 regular state cost of education per pupil. Moreover, this cost of incarceration does not include court costs, damage to property, loss in productivity, increased insurance rates, loss of human life, incapacitation, and/or hospital costs for the victim—all of which may be due to criminal acts. Educating a dropout the estimated average of 2.22 years to high school completion would cost \$14,133—about 41% of the cost of incarceration of a prisoner for one year. Levin (1972) estimated that as much as 25% of all costs associated with criminal activity could be attributed to undereducation (not completing high school).

Cost Factor 4: Deceleration in Human Growth and Potential

The costs in terms of human growth and potential of dropouts include the following:

- lower cognitive skill level
- reduced options to economic progress

¹³ This odds ratio is different from the traditional odds ratio based on counts or proportions in a 2 x 2 table (e.g., Fleiss, Levin, & Paik, 2003, pp. 100-106). The odds ratio used here is exactly equal to the relative risk of incarceration for dropouts; the traditional odds ratio is an approximation to the relative risk.

- restricted social network
- poorer health (more likely to have unhealthy behaviors; less likely to have healthy ones)

Many dropouts cannot read a map or perform calculations necessary to balance a checkbook (National Center for Educational Statistics, 1987). They have fewer options to programs which promote economic progress. For example, postsecondary educational institutions and the military both require a high school diploma or equivalency (GED/HSED).

In 1999, U.S. organizations with 100 or more employees spent 62.5 million dollars on training (“Industry Report,” 1999). However, this centers on learning for managers and professionals, with less expended to productivity training for service workers or basic schooling for unskilled workers (Davis and Botkin, 1994). In fact, ASTD research found wide variance in the amount of training workers receive based on occupation, pay, and education level (McMurrer, Van Buren, & Woodwell, 2000).

In a study of over 1,000 full-time employees in 60 organizations in Iowa, researchers found that those with more education spent more time in work-related learning activities. The amount of time employees *preferred* to spend in such activities was also greater for those with more education. In addition, awareness of corporate policies supporting education and training was greater among those with more education (Westbrook & Veale, 2001). Adults with less education thus appear at risk of not having the knowledge and policy awareness needed to advance in learning organizations, further evidence of the “knowledge divide” in our society (Davis & Botkin, 1994).

The dropout’s social network is likely to become restricted to others of similar educational status. The topics of social discourse between dropouts and graduates will naturally become fewer as the educational gap between them widens. Moreover, there is evidence that dropouts exhibit more risky health behaviors. In statewide Youth Risk Behavior Surveys conducted in 1999 and 2001, alternative school students (many of whom had dropped out of traditional schools) had higher percentages indicating negative health risk behaviors such as tobacco, alcohol, and other drug use (e.g., Veale, 2002a and 2002b).

Cost Factor 5: Reduced Sense of Control over One’s Life

Dropouts project a more *external* “locus of control” than do graduates (Coleman & DeLeire, 2003; Ingram, 2006). In other words, dropouts have a reduced sense of control over conditions which affect their lives. Things happen *to* them which they feel they cannot control. They tend to be more likely to feel that luck is more important than hard work in obtaining success in life.

The implications of this result concerning locus of control are somewhat different from those of human growth and potential, although it contributes to some of the same types of costs. It could be one factor contributing to the aforementioned “knowledge divide” and unhealthy, risky behaviors. For example, the idea that luck is more important than hard work could lead to problems with gambling addiction via the multiple avenues that are increasingly available in Iowa for such nonproductive and potentially harmful activities. A reduced sense of control could also be a factor in the higher percentages of dropouts indicating the aforementioned health risk behaviors. In addition, a person with a reduced sense of control over her/his life might be less likely to become involved in the political process, to participate in volunteer activities, or to take

responsibility and initiative in the work place. A person with less feeling of control over her/his environment will probably be less likely to participate in activities to change that environment.

Cobb-Clark (2014) conducted an extensive review of research on locus of control and the world of work. She found that having an *internal* locus of control leads to higher earnings, greater job satisfaction, less job stress, and a higher probability of re-employment and shorter durations of unemployment after a job loss. Individuals with an internal locus of control believe that events in their lives are caused by their own actions, e.g., hard work and perseverance. Since high school dropouts are more likely to exhibit external (rather than internal) locus of control, they will be less likely to achieve these labor market successes than will high school graduates.

Cost-Benefit Analysis: Dropout Prevention and At-Risk Programs

A preliminary study, using conservative estimates, indicated that prevention programs funded via additional allowable growth and supplemental weighting formulas had been cost-effective in graduating at-risk students who might otherwise have dropped out (Prouty, November 2004). This study has been updated with the most current data and some minor modifications.

Cost Analysis

The cost for programs directed to dropout prevention (“modified allowable growth”) was \$137,978,292. The cost for programs directed to at-risk students (“supplemental weighting”) was \$15,102,434. The total cost of these programs which together are intended to keep students in school was \$153,080,726 (= \$137,978,292 + \$15,102,434). The number of students in grades 7-12 who were in free or reduced lunch programs in 2014 was 80,366 or about 13,394 per grade. Thus, we estimate that there were 13,394 students who were in free/reduced lunch programs who were in Grade 12 in 2014. Since there were estimated to be 3,156 non-GED/HSED dropouts in 2014, we estimate that about 10,238 (= 13,394 - 3,156) of those on free or reduced lunch programs graduated or earned a GED or HSED. Since poverty is one risk factor associated with dropping out of school, the estimated cost per graduate (or GED/HSED earner) of these programs was \$14,952 (= \$153,080,726/10,238).

Benefit Analysis

The estimated (income) tax liability on the median income of an Iowa high school graduate (including GED/HSED earners) in 2014 was \$933, while that for an Iowa dropout in 2014 was \$612, yielding an state income tax difference of \$321 (= \$933 - \$612). Assuming 30% of income is spent on goods and services taxed at 6%, yields a sales tax difference of

$$(\$28,792 - \$22,288) \times 0.3 \times .06$$

or about \$117. Assuming a constant difference over 45 years of work, the benefit or estimated revenue increase for an Iowa high school graduate or GED/HSED earner compared with a dropout, was \$19,728 [= 45 × (\$321.32 + \$117.07)].¹⁴

¹⁴ Additional decimal places were used in this calculation involving a large multiplicand to achieve greater accuracy.

Cost-Benefit Analysis

Since the estimated benefit as measured by the revenue increase for a high school graduate or GED/HSED earner compared with a dropout (\$19,728) exceeded the estimated cost of dropout prevention programs per graduate or GED/HSED earner (\$14,952), the programs produced a net benefit, i.e., they “paid for themselves.” A benefit-cost ratio may be calculated by taking the benefit divided by the cost, which in this case yields 1.32 (= \$19,728/\$14,952). This ratio indicates that benefits exceeded costs by 32%.

The estimated revenue increase for *all Iowans* (not just high school graduates and GED/HSED earners) compared with a dropout over a 45 year working life was \$40,238. This yielded a benefit-cost ratio of 2.69, indicating that benefits using all Iowans as a comparison group exceeded costs by 169%. This may be a more appropriate ratio since the high school diploma is often viewed as a gateway to further education, which produces higher median incomes.

The above cost-benefit analysis has the following limitations:

- uses only poverty to define a student as “at-risk” of dropping out of school;
- considers only increased revenue as a benefit;
- assumes a constant difference in tax liability over the 45 year lifetime of the graduate and dropout.

The first two limitations make the above results conservative; the third one has the opposite effect. Many factors (e.g., teen pregnancy, substance abuse, culturally-related issues) have been identified as contributing to a student’s risk of dropping out of school (e.g., Morley & Veale, 2005). However, economic disadvantage is easy to quantify (i.e., number of students in free or reduced lunch programs) and most would agree that it is a primary factor leading to dropping out of school. Increased revenue is only one of many benefits of a diploma including, e.g., enhanced quality of life, better access to health knowledge and care, and improved networking, but it is easy to quantify and most would agree that increased revenue is beneficial. Assuming a constant difference in personal income (and tax liability) over the 45 year lifetime of the graduate and dropout ignores the effect of work experience over time that would probably reduce the gap somewhat.

Costs of Dropping Out: 1990 to 2016

The results for the quantitative costs of dropping out reported in the 1990 and 2016 studies are summarized in Table 1. In addition, the benefit-cost result from Prouty (2004) is presented. No attempt was made to adjust for inflation.¹⁵ The cost to the state of Iowa in terms of reduced

¹⁵ Inflation could have affected (increased) the first two cost factors (state revenue and welfare). The third cost factor does not (directly) involve money, nor do the fourth and fifth cost factors. The cost-benefit analysis involves ratios where the numerator and denominator both involve money in 2014-15 dollars, so inflation should not be an issue.

revenues per year increased somewhat,¹⁶ while the cost in terms of increased welfare stayed the same when based on unemployment (U-3 type) rates, from 1990 to 2016. The welfare cost was substantially greater when based on both unemployment and labor force nonparticipation rates.¹⁷ The relative risk of incarceration among dropouts remained at about the same level during this period—5 to 6 times that of high school graduates. The benefit-cost ratio obtained from Prouty’s cost-benefit analysis in 2004 was 1.08; this ratio increased to 1.32 (using the dropout to high school graduate income comparison) in 2016.¹⁸ Some of these differences over time are due, in part, to inflation and/or changes in how the various costs and benefits are calculated (see footnotes 15-18).

Table 1: *Costs of dropping out in 1990 and 2016; cost-benefit analyses in 2004 and 2016*

Cost Factor/Analysis	1990	2004	2016
1. Loss in personal income over 45 year life-time	\$340,000		\$583,335
Cost to state in reduced revenues per year	\$2.0 million		\$2.8 million
2. Increase in welfare burden	\$2.4 million ^a		\$2.4 million ^a \$7.3 million ^b
3. Increased risk of incarceration	5.6		5.1
Cost-benefit analysis: Benefit-cost ratio (high school graduate versus dropout)		1.08	1.32

^a Calculated using difference in unemployment rates (based on numbers in labor force for each education category).

^b Calculated using differences in unemployment and labor force participation rates (based on total numbers in each education category).

The figures in Table 1 refer to the *quantitative* costs—factors 1-3 as originally defined in 1990 and the cost-benefit analysis first conducted in 2004. Although we cannot attach a dollar figure to it, cost factor 4 may well have increased in that cognitive skills and other human growth and development assets are critically important in the global, high tech, knowledge-based economy of today. Cost factor 5 could also have increased in that dropouts’ external locus of control could

¹⁶ It should be noted that sales tax was included in the 2016 calculations, but was not part of the 1990 analysis. Including the sales tax increases the estimated reduction in state revenue. However, the estimated number of GED/HSEDs (awarded to 16-18 year olds) was subtracted from the number of dropouts in 2014, which has the opposite effect on reduction in state revenue.

¹⁷ This three-fold increase in the welfare cost is attributed to including the estimated welfare payments due to the lower rate of labor force participation among dropouts in the 2016 calculations. This component was not included in the 1990 (or any previous) analysis.

¹⁸ Sales tax was included in the 2016 cost-benefit analysis, but was not part of the 2004 analysis. This would tend to increase the estimate of benefits. The estimated number of GED/HSEDs (awarded to 16-18 year olds) was subtracted from the number of dropouts in 2014, but not in the 2004 analysis. This tends to increase the estimated number of graduates in free/reduced lunch programs and decrease the cost (per graduate). Each of these factors tends to increase the benefit-cost ratio.

lead to increased costs associated with the increased opportunity for gambling in our state, risky health behaviors contributing to morbidity and social problems, and segregation via the “knowledge divide.”

Impact of Dropouts at the Local Level

Since around 2008, the State of Iowa has tracked dropouts (and graduates) via State ID student numbers. To some extent, the increase in the dropout rate in the following two years was a statistical artifact; tracking by State ID likely yielded a more accurate count of dropouts. This increase could also have been due, in some part, to the downturn in the economy during the years 2008-2010.

Fortunately, the dropout rate leveled off and has decreased in each of the past four years. However, as shown above, some of the costs of dropping out have actually increased. When viewed from the local school district perspective, there is the more immediate and direct cost of reduced state funding for their education programs due to dropouts in their district. School districts experience these reductions in state funding for education, in direct proportion to their number of dropouts. For example, a district with 100 dropouts in 2015 would have lost (a minimum of) $\$6,366 \times 100$ or $\$636,600$. Including other than regular education costs (e.g., special education and dropout prevention), $\$10,247 \times 100$ or about $\$1,024,700$ would have been lost in this district due to their dropouts.

Other costs of dropouts at the local level include the likelihood of increased criminal activity (due to increased risk of incarceration), increased unemployment and use of the welfare system, and reduced local tax revenue (due to lower personal income levels of dropouts). These costs may be estimated by inputting local data (instead of state-level data) in the calculations illustrated in this report.

Programs and Challenges

In all, these five costs of failing to educate our youth to high school completion (and hopefully, beyond high school), as well as the above cost-benefit analysis and local impact analysis, provide a compelling case for social and educational innovation. These costs can be turned into savings or gains in state revenues, with appropriate and effective programs for reducing the number of dropouts. If viewed over the lifetime of the student, these savings may be quite impressive—both in quantitative and human terms.

Programs that Have Helped

Examples of social and educational innovations introduced or expanded in Iowa during the past two decades that have contributed to the reduction in the dropout and unemployment rates over this period include:

- Dropout prevention programs in 237 school districts supported via Iowa Code 257.38-41, providing a variety of initiatives to keep students in school including before- and after-school programs, school-based services, and alternative education;

- Iowa’s School-Based Youth Services Program(s) supported by state grants from 1990-91 to 2001-02 and currently supported via Iowa Code 257.38-41, collaborative services programs serving pre-K to 12th grade students in the areas of health, mental health, training and employment, recreation, and life skills (Veale, Morley, & Erickson, 2002);
- Drug and violence prevention programs, such as Safe and Drug Free Schools through Supportive Community Partnerships at Woodbury Elementary School in Marshalltown, supported by a grants from the Iowa Department of Public Health from 1996 to 2010, providing small group activities and classroom integration in anger control, character development, empathy, social skills, and leadership, as well as community service learning activities (Veale, July 2010);
- 21st Century and Safe Schools/Healthy Students grants, providing federal resources for funding after-school programs and other educational, pro-social activities for children in selected communities such as Community Connections in Waukon and Husky Adventures in Oelwein (e.g., Veale, 2014);
- Alternative schools/programs and high school completion programs providing a second chance for dropouts and a *choice* of an alternative approach to education; many of these are associated with community colleges, providing a natural gateway to postsecondary education after graduation; others, such as Scavo High School in Des Moines, have become “full-service” schools, with multiple services available on site, including health, mental health, and employment services; home schooling and charter schools are other alternatives that may be appropriate choices for some families and students.
- Career Education and School-to-Work, educational initiatives designed to provide a sense of purpose to education and to encourage students of all ages to explore interests and what it takes to develop and maintain a rewarding career;
- IJAG (Iowa Jobs for America’s Graduates), a Governor’s initiative to improve the potential of dropouts and potential dropouts to succeed in employment and thereby improve productivity in communities;
- School improvement initiatives for all school districts (public and private) to assure services for all students, with specific emphasis on improving student performance and maximizing potential;
- Federally sponsored drug-free schools initiatives to help schools address substance abuse through education and intervention assistance programs, used by 99% of the school districts in Iowa to assist students in this health concern;
- Surveys for monitoring risky youth behaviors (Youth Risk Behavior Survey and Iowa Youth Survey) and school health programs and policies (School Health Profiles) (e.g., Veale, 2012, 2013);

- Career and technical education programs which offer lab and community-based practical application training opportunities, leadership development, and cooperative work experiences.

These examples are not intended to be exhaustive but represent the fact that Iowa is addressing the issue of dropping out at a significant level. We do not know the full impact of these initiatives on the dropout problem. However, many of these fall into the categories of basic core strategies to help solve the school dropout problem identified by the National Dropout Prevention Center at Clemson University (Schargel and Smink, 2001). Moreover, early records of dropouts before such initiatives were introduced in Iowa indicate a dropout rate of well over 10%. If this were the case today the (negative) economic impact to the state of dropouts would be far greater. Therefore, *these and other programs and initiatives should be supported and expanded to further reduce the dropout rate and the costs associated with it.*

Challenges for the Future

The main challenge for the future will be to find a way to finance the above programs and initiatives with a 19.4 trillion dollar national debt, about 95 million Americans of working age not participating in the labor force, and a historically weak recovery from the 2008-09 housing/financial crisis and economic meltdown. In addition, according to the Economic Policy Institute, American workers at *all* education levels *lost ground* in terms of wages/salaries from 2007 (the year before the start of the recession) to 2014 (well into the “recovery” period), after adjusting for inflation.¹⁹ Iowa’s economic and fiscal numbers look better than those of the nation as a whole, but the critical agricultural sector has suffered recently from falling land and grain prices.

Other challenges include substantially reduced enrollment in teacher preparation programs and, making matters worse, many disillusioned teachers leaving the profession within five years (Bruni, 2015). Shootings, bullying, gang activity, and other types of violence (directed against students and/or teachers/staff) are serious problems that continue to plague our public schools. Electronic bullying via the various “social media” is another component of this problem (e.g., Veale, 2012). Along with the perceived lack of professional support, low pay, and stress leading to burnout, violence against teachers was a critical reason for teachers in a major metropolitan school district in Iowa leaving the profession within seven years (Steggerda, 2003, and personal communication, 2015). Much of this violent behavior appears to be related to emotional and mental health factors. In a recent state survey, most lead health education teachers indicated that they need more staff development in all health areas, but especially in violence prevention, suicide prevention, and the emotional/mental health of students in their schools (Veale, 2013). A related problem is substance abuse—use of alcohol, cocaine, marijuana, heroin, other illicit drugs, and/or taking prescription drugs without a doctor’s prescription—*often in various combinations* thereof (Fox, McManus, & Arnold, 2010 and Veale, 2012).

School policies and practices have been reported that are linked to school failure and dropping out (Morley, 1989). In a survey of 45 reasons alternative school students selected for their dropping out of a regular high school, seven of the top ten reasons dealt with teaching practices (e.g.,

¹⁹ An increase in household income was recently reported for 2015, but overall median income was still below that of 2007.

lecturing most of the time, not teaching in a way they could learn, needing more individual help to learn) and the other three involved school policies (having to be a full-time student with a full schedule, knowing they could miss a certain number of days before the school would do anything, and unfair discipline and punishment rules) (The Associated Press, 1989, November 28). The negative effects of these policies and practices have been described and alternatives that may yield more positive effects suggested. For example, lecturing and monitoring student work reinforces student passivity and negates their sense of relevancy to the learning process (Morley, 1989). Alternatives include open discussions in classes, cooperative (group) learning, diagnostic assessment and feedback regarding work performed, and service learning projects involving interaction with the community (ibid.).

Federal requirements have often exacerbated the dropout problem by reducing local or state control over education. The failure to recognize graduation after the four year high school period is a disincentive for schools to provide services to dropouts and other highly challenged students who need more time to learn (Raymond Morley, personal communication, 2016). Also, although a standardized test can yield useful, objective data for assessing student growth and evaluating education programs, the amount of time devoted to this type of testing in schools may be inhibiting learning. Replacing the No Child Left Behind Act with the Every Student Succeeds Act, which hands accountability provisions from federal regulators back to the states and local school districts, appears to be a step in the right direction (Peterson, 2016).

Elementary and secondary education is currently focused on curriculum, standards, and benchmarks (e.g., “common core”), with standardized tests used to measure the success of this approach. The idea is to insure that students are academically prepared to attend and succeed in four-year colleges and universities, since we need more highly skilled workers in the high tech, information-based economy of today. Also, as we have seen, incomes tend to improve with more education, which in turn provides more revenue for education and other government programs. On the other hand, many of today’s college graduates are burdened with high levels of debt (current national total: 1.37 trillion dollars) due to increases in tuition, fees, and other education costs that continue to far outpace inflation.²⁰ In addition to the need for more doctors, medical researchers, engineers, computer scientists, and teachers (each requiring at least a bachelor’s degree), there is a need for more electricians, computer technicians, plumbers, welders, and auto mechanics. The latter require a type and level of skill that is *not* provided by the current focus in education. Perhaps a more flexible *student-centered* (“personalized”) focus is needed, with a renewed emphasis on student career development and vocational education (e.g., Barr & Parrett, 2001, pp. 188-198).

Leadership will be required to determine which programs should continue to be supported (or resurrected) and which should be discontinued—and perhaps to develop new, innovative, more cost-efficient approaches to address the dropout problem and related challenges in education. Evaluation will remain a critical part of this process, providing the necessary data and analysis for program accountability (e.g., Veale, Morley, & Erickson, 2002).

²⁰ College debt was *not* included in the calculations on personal income for graduates (including those with some college or degrees) versus dropouts.

Future Research

The spreadsheet template on the costs of dropping out of school in Iowa will be updated as soon as new data (on personal income, education cost per pupil, welfare costs, unemployment rates, etc.) become available. In addition, it is hoped that the 1989-90 Iowa Department of Education companion study on the productivity benefits of returning and graduating can be updated by conducting a survey of recent alternative school graduates in Iowa.

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APPENDIX A

Spreadsheet Template for the Costs of Dropping Out

An *Excel* (Microsoft, Inc.) template is available from the Iowa Association of Alternative Educators web site (www.iaae.net) or by contacting the author (Veale.JR@gmail.com). The quantitative costs, along with the cost-benefit analysis, have associated sheets in the spreadsheet template that are referenced and discussed here. The template was developed for the costs of dropping out (and related analyses) for the State of Iowa, but can be used with appropriate data from other states or local school districts. *Care should be taken not to enter data in cells that contain formulas. It is recommended that you keep one version of this template with the Iowa state-level data and make a copy for your use with district- or county-level cost data, or use with data from another state.*

1. State Dropout Rates

The state dropout rate data are presented on the “Iowa DO rate” sheet. The 7-12 per grade dropout rates may be entered in column B, rows 2 to the row corresponding to the current year. The 7-12 cohort rate and 7-12 adjusted cohort rate are calculated in columns C and D for the corresponding rows. Line graphs corresponding to the three dropout rates are presented on the right side of the sheet. [Caution: This graphic does not update automatically. It must be edited to make sure the data series include the new year(s) of data added in column B.]

2. Subgroup Dropout Rates

The subgroup 7-12 per grade dropout rates are presented on the “Subgroup DO rate” sheet. These may be obtained from the “The Annual Condition of Education Reports” available from the Iowa Department of Education (or similar document for application to other states), e.g., for 2014 data, see Iowa Department of Education (2015), p. 206.]

3. Personal Income and “Hourly Worth” of High School Diploma

The data for median incomes (and amount of error) may be entered in the column B (C) in rows 2-7 of the “Personal Income” template sheet. The comparisons yielding the amount in “hourly” wages high school is worth and the loss in lifetime income are computed in column B (rows 10-13 and rows 16-17) of the spreadsheet. Graphics are also provided on this template sheet.

4. Decreased Revenue

The data for the number of dropouts, number of GED/HSEDs (equivalency earners), state sales tax, percent of income applied to sales, and the regular state cost per pupil may be entered in column B, rows 1, 2, 6, 7, and 9, respectively, on the “Revenue” template sheet. The spreadsheet computes the estimated income tax liability on median dropout and overall graduate incomes in column B, rows 4 and 5, respectively, and the costs due to dropouts’ reduced income tax and sales tax (over a 45 year working lifetime) in rows 12 and 13, respectively. The total cost to the treasury due to dropouts’ reduced taxes over a 45 year working lifetime is computed in row 14; the total annual cost due to dropouts’ reduced taxes is computed in row 15. The state cost to educate all dropouts (minus the estimated number of GED/HSEDs) to graduation is calculated in row 17. The potential net increase in the state treasury therefrom, over a 45 year working lifetime, is calculated in row 18; the potential annual net increase is calculated in row 19. These figures all appear in

column B. The corresponding figures in column C utilize the total state cost per pupil (entered in row 9), which includes funding for dropout prevention and at-risk programming.

5. Increase in the Welfare Burden

The dollar amounts for Food Assistance, Family Investment Program, and Medicaid for the current year may be entered in column B (rows 2-4) in the “Welfare & Work” sheet; the total welfare payments per annum is calculated in row 5. Numbers of persons unemployed, in the labor force, and total for dropouts, high school graduates, some college/AA degree, and Bachelor’s degree or higher may be entered in columns D-F and rows 8-11 in this sheet. The unemployment rates for the four education categories are calculated in columns B (based on number in labor force) and C (based on total number), rows 8-11; the labor force participation rates for the four categories are calculated in column B and nonparticipation rates for the four categories are calculated in column C, rows 14-17. The overall graduate unemployment rates are calculated in columns B and C, row 12; the overall graduate labor force participation and nonparticipation rates are calculated in columns B and C, row 18. Graphs of these unemployment and labor force participation rates are displayed in the lower right corner of this sheet. The estimated increase in annual welfare payments due to dropping out and being unemployed is calculated in column B, row 24 (based on the *number in the labor force*) and column C, row 24 (based on the *total number of potential workers*); the estimated increase in annual welfare payments due to dropping out and not participating in the labor force is calculated in column C, row 29. The total estimated increase in welfare payments due to dropping out of school is calculated in column C, row 31.

6. Increased Risk of Incarceration

The number of incarcerated reporting their highest education level being grades 1-5, grades 6-8, grades 9-12, high school diploma, GED/HSED, secondary (technical or vocational degree), post-secondary, doctoral, as well as those who were in special education and whose highest education level is “unknown,” may be entered in column B, rows 2-11 in the “Risk Incarceration” sheet. A pie chart representing the broad areas of dropouts, high school graduates, and others among Iowa’s incarcerated is presented in the bottom right of the sheet. The increased risk of incarceration among dropouts is calculated in column E, rows 2 and 3, using the cohort and adjusted cohort dropout rate, respectively. The cost of incarceration may be entered in column E, row 5. The ratio of that cost to regular and total state costs of education are calculated in column E, rows 6 and 7, respectively. (“Total” state cost of education includes special education, dropout prevention, and other “supplemental” costs.)

7. Cost-Benefit Analyses

The costs of modified allowable growth (dropout prevention) and supplemental weighting (at-risk programs) may be entered in column B, rows 2 and 3, respectively, in the “Cost-benefit” sheet. The total cost of these programs is calculated in column B, row 4. The number of students in free or reduced lunch programs may be entered in column B, row 7; the number in these lunch programs per grade (in particular, the number who were in Grade 12 in 2014) is calculated in column B, row 8. The number of dropouts appears (from an entry on “Revenue” sheet) in column B, row 9. The estimated number of graduates who were in free/reduced lunch programs is calculated in column B, row 11. The estimated *cost* per graduate who was in free/reduced lunch programs is calculated in column B, row 14.

The estimates of income tax liability for dropouts, high school graduates, and all Iowans appear in column E, rows 2-4 (copied from entries on “Revenue” sheet). The estimated differences in tax liabilities between (1) dropouts and high school graduates and (2) dropouts and all Iowans are calculated for state income tax in column E, rows 6 and 7, respectively, and state sales tax in column E, rows 9 and 10, respectively. The estimated *benefit* or state revenue increases (income tax plus sales tax) for a 45 year lifetime of work are calculated in columns E, rows 13 and 15, for dropouts compared with high school dropouts and all Iowans, respectively.

It remains for the user to simply compare the benefit numbers in column E, rows 13 and 15, with the cost number in column B, row 14. The benefit-cost ratios are calculated in column E, rows 17 and 18, for the two revenue comparison groups—high school graduates and overall (all Iowans). Benefit-cost ratios that are equal to or greater than 1.00 indicate the programs are “paying for themselves.”

8. Impact of Dropouts at the Local Level

The regular state cost per pupil and total state cost per pupil (including programs such as special education, dropout prevention, and at-risk) appear in column B, rows 2 and 3 (from entries in the “Revenue” sheet). (The actual district costs per pupil may be slightly different. If these are available, they may be entered in these cells.) The number of dropouts in a school district may be entered in column B, row 1. The reduction in state funding based on the regular state cost per pupil and the total cost (including special education, etc.) are calculated in column B, rows 5 and 6, respectively.

The user may add other types of local costs in column A, from row 9, and estimates of these costs in the corresponding rows in column B, if available. Alternatively, if local information is available on personal income, unemployment, labor force participation, and incarceration (by education levels), welfare costs, number in free/reduced lunch programs, etc., this may be entered in appropriate cells in the other sheets in the template.

APPENDIX B

Derivation of the Formula for Relative Risk of Dropping Out

We require the relative risk of becoming incarcerated among dropouts compared with that of high school graduates, which is the ratio (R) of the probability of incarceration (I) given a dropout (DO) to the probability of incarceration given a graduate (GR):

$$R = P(I|DO)/P(I|GR)$$

Now, by definition of conditional probabilities:

$$\begin{aligned} P(I|DO) &= P(I \text{ and } DO)/P(DO) \\ &= P(DO|I) \times P(I)/P(DO) \end{aligned}$$

and

$$\begin{aligned} P(I|GR) &= P(I \text{ and } GR)/P(GR) \\ &= P(GR|I) \times P(I)/P(GR) \\ &= [1 - P(DO|I)] \times P(I)/[1 - P(DO)] \end{aligned}$$

Thus, R is given by:

$$\frac{P(DO|I) \times P(I)/P(DO)}{[1 - P(DO|I)] \times P(I)/[1 - P(DO)]}$$

Note that “P(I)” occurs in the numerator and the denominator, so it “cancels.” Rearranging the factors, this yields the following:

$$\frac{P(DO|I)/[1 - P(DO|I)]}{P(DO)/[1 - P(DO)]}$$

or the ratio of the odds of dropping out among incarcerated to the odds of dropping out in the general population. The former is estimated by the proportion of the number of incarcerated in Iowa who did not graduate out of the total number of incarcerated excluding the GED/HSEDs and unknowns, divided by its complement (proportion subtracted from 1). The latter is estimated by the cohort (or adjusted cohort) dropout rate expressed as a proportion divided by its complement (proportion subtracted from 1).