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Aid from Canada to Ireland During the Food Shortages of the 1860s

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Abstract

One of the understudied episodes of Canadian philanthropy is Canadian aid to Ireland during the nineteenth century. At least four times, during the Great Hunger in 1846-47, the food shortages of the 1860s, the Little Famine in 1879-80, and the food shortages in 1890-91, Canadians opened their pockets and purses to aid starving Irish. Merle Curti's American Philanthropy Abroad (1963) offered a history of American voluntary aid during foreign crises, but Canadian historians have not written a Canadian equivalent. This study looks at how Canadians responded to the food crisis in Ireland in the 1860s. During these Irish crises, citizens of the United States and Canada put aside political, sectarian, and ethnic differences to aid the famishing Irish. Writing in 1880, a local newspaper in Charlottetown, Prince Edward Island, emphasized that collections came in "from all classes and creeds." Jeremiah Conway, president of the Charitable Irish Society of Halifax, Nova Scotia, similarly stressed in 1863 that he collected "contributions from citizens of all religious denominations." Catholics and Protestants put aside sectarian and partisan differences to view the Irish as fellow Christians and fellow human beings, dying of starvation and in need of aid.

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Introduction

One of the understudied episodes of Canadian philanthropy has been Canadian aid to Ireland during the nineteenth century. At least four times, during the Great Hunger in 1846-47, the food shortages of the early 1860s, the Little Famine in 1879-80, and food shortages in 1890-91, Canadians opened their pockets and purses to aid the starving Irish. Merle Curti wrote *American Philanthropy Abroad*(1963), a history of American philanthropy and voluntary aid during foreign crises. Canadian historians have not written a Canadian equivalent.

Christine Kinealy (2013) wrote a major study of international philanthropy during the Great Hunger, *Charity and the Great Hunger in Ireland: The Kindness of Strangers, but it* briefly mentions Canada. A more recent study by Anelise Shrout, *Aiding Ireland,* (2024) discusses international philanthropy, but omits the major role played by the peoples and governments of British North America (Canada).

Similarly, Helen Hatton's *The Largest Amount of Good,* (1993) a detailed summary of Quaker aid to Ireland, devotes only a couple of sentences to aid from Canada during the Great Hunger. Rob Goodbody's briefer account of Quaker aid during the Great Hunger omits British North America. (1995). This suggests there is a void in the historiography of international aid to Ireland because of limited coverage of aid from Canada.

Historians studying the impact of the Great Hunger on Canadians stress the impact of Irish immigrants fleeing the famine to Quebec, Ontario, Nova Scotia, and New Brunswick. As a few examples, Mark Mc Gowan (2009) analyzed the impact of famine immigrants on Toronto, and W. Donald Mac Kay (1990) wrote about the flight of the Irish to British North America (Canada). Terrence Punch (1981) researched the Irish in Halifax as did A.J.B.Johnston (1991). Doyle Lahey (2010) comparative analysis of the Irish in Halifax, Saint John, and St. John's concentrated on the adjustment of the Irish and the nativist response. Lisa Bunyan (2018) studied Irish identity in 1840s Halifax discussing adjustment and religious antagonism, William Spray (1991), Philip Toner (1988), Ronald Rees (2000). and Harold Wright (1991) studied Irish immigration and famine Irish in New Brunswick. Leo Hynes (1992) wrote a detailed history of Irish Catholics in New Brunswick. Patrick Mannion (2018) looked at Irish ethnicity in Newfoundland and compared the Irish experience in Halifax, St. John's. and Portland, Maine from 1880-1923. Lucille Campey (2016) researched Irish immigration to Atlantic Canada before and during the Great Hunger. However, none of these works emphasized Canadian aid to Ireland. Even the massive *Untold Story: The Irish in Canada,* (1988) edited by Robert O'Driscoll and Lorna Reynolds, explored Irish settlement in Canada, but not the efforts of Canadians and Irish immigrants to aid the starving in Ireland. Several recent studies by Laura Smith (2020), Jason King (2020), and Mark McGowan (2000) concentrate on Irish migration and the impact of the Irish, but not the separate but related issue, how Canadians established temporary relief committees to alleviate the suffering in Ireland.

The historiography of Canadian philanthropy is limited. Christine Kinealy (2013) history of international philanthropy during the Great Hunger devoted several paragraphs to British North America, on Quebec, Halifax, Montreal, and Toronto, and briefly mentioned Newfoundland and New Brunswick. Anelise Shrout (2024) work on transnational philanthropy during the Great Hunger ignores Canadians. Pauline Collombier-Lakeman (2015)

essay on the Canadian press and the Great Hunger includes as summary of Canadian aid as does the older article by John O'Reilly (1947). Donald Atkinson in *Irish in Ontario* (1984) mentioned famine relief in 1847 in Brockville, and Joy Parr's article (1974) on the Irish in Ontario credited voluntary organizations performing "their Christian duty, collecting aid in goods and coin for the destitute." (1974, 102-03) Terence Punch's study of the Irish in Halifax (1981) mentions relief aid in 1847 in passing, Graeme Wynn/s work (1986) on political divisions, ethnicity, religion, migration, and locality indirectly relate to international aid in 1847. Harvey Strum, (2020) wrote an article on aid from Atlantic Canada during the Great Hunger. Generally, historians tended to focus on local philanthropy. Judith Fisgard, for example, (1975) discussed relief for the poor in Halifax, Saint John, and St. John's from 1815-1860.

No historians have focused on Canadian aid in the 1860s. There are no comprehensive studies of Canadian aid during the Litle Famine or the food shortages of 1890-91. For the Little Famine, historians researched migration to Canada. Timothy Forest (2020) emphasized the proposed New Ireland in western Canada. Gerard Moran, the leading historian of the Little Famine, (2020), analyzed assisted migration from Ireland during 1879-82 to Canada and the United States. Patrick Mannion (2018) studied Irish nationalism in Newfoundland, Maine, and Nova Scotia. He mentioned the role of the Charitable Irish Society in Halifax in 1880 and famine aid in Newfoundland. D, C. Lynn (1967) researched Irish contributions to home rule movements in the 1890s and estimated that in 1879-80 government and private aid to Ireland totaled $202,000 with private philanthropy amounting to $80,000 of the total aid. American aid was voluntary since American presidents in the nineteenth century viewed foreign aid as unconstitutional. Canadian governments did not have the constitutional reservation but sporadically provided aid. In 1847 several towns, cities, and provinces voted appropriations, and in 1880 the federal government of Canada and several provinces gave aid to Ireland. This essay enlarges the historiography of Canadian philanthropy by looking at how the people of Canada rose to the occasion and helped temper the food crisis in Ireland in the 1860s.

Aid to Ireland helps us understand the role of Canada in international philanthropy. At the time, whether in 1847, 1863 or 1880 Canadians showed no shyness in boasting of Canada's generosity. For example, in 1847 a Fredericton, New Brunswick newspaper impressed by the good work in Saint John noted: "in Saint John they have done themselves much honour by the liberality" of donations to Ireland. (*Head Quarters*, 20 March 1847). The *Christian Messenger,* a Protestant publication in Halifax boasted that "private contributions on an extensive scale are going on in Halifax, St. John and various parts of British North America," (5 March 1847) A Montreal newspaper in 1880 argued that Canadians gave more "in proportion to their population…than has left the United States." (*True Witness*, 3 March 1880) Competition with the United States spurred Canadians to act, whether in 1847, 1863, 1880, or 1891. "A Voice from New Brunswick asked on 27February 1863:"Will you let your American neighbors outstrip you in the good work of charity?" (Saint John *Morning Express*, 28 February 1863) In 1862-63 contributions came from Canadians in public meetings that established temporary voluntary relief committees. Speakers at public meetings and the press indicated aid to the Irish was non-partisan and ecumenical. People of every class, ethnicity, and religious denomination participated in famine relief. Clergymen of every denomination gave sermons encouraging parishioners to aid the starving, Irish. Funds came from meetings in Catholic churches and Irish organizations. The poor and middle class sent individual remittances in cities, like Halifax and Saint John, to kith and kin in Ireland. As during the 1847 and 1880 campaigns for famine relief, Protestants in Canada

saw Catholics as fellow British subjects suffering starvation, disease, and death who needed help from British North America. Contributions in 1863 were not as large as in 1847 or 1880 because residents of Canada also donated to the British Operatives' Relief Fund. (Halifax *Morning Sun*, 9 March 1863)

Unfortunately, no study documents the depth and breadth of international philanthropy by Canadians. The people of Canada frequently came to aid people in international crises, like the British Operatives' Relief Fund in 1863. During the American Civil War, the Union boycotted southern cotton leading to thousands of English workers losing their jobs. Reports from Nova Scotia alone indicated that residents raised $27,750.38 for the General Committee of the British Operatives' Relief Fund.to relieve the distress of English workers. (Halifax *Acadian Recorder*, 7, 11 July 1863) When the French suffered "the ravages of the Franco-Prussian War" the people of Canada aided them. (St. Andrews *Bay Pilot.* 19 February 1880,2) Queen's University Principal George Munro Grant led a campaign to raise funds for Armenian relief in response to the Ottoman killings of Armenians between 1894-96, Canadians donated $30,000. During World War I, Canadians organized the Armenian Relief Association of Canada raising hundreds of thousands of dollars to assist the victims of the Ottoman genocide of Armenians from 1915-1923. The Canadian Committee for Belgian Relief helped displaced Belgians during World War I. Canadian labor unions and Ukrainian Canadians donated thousands of dollars to alleviate famine in the U.S.S.R. in 1920-21. A major exception to Canadian generosity occurred between 1933-1948 when the Canadian government and the Canadian public ignored the plight of German and European Jews (Abella & Troper, 2002). Repeatedly, the people of Canada, like their American neighbors, rallied to assist people in foreign crises. In 1847, 1862-63, 1879-80, 1890-91, the people of Canada stressed that citizens and immigrants of every ethnicity and religion joined together to aid the Irish. Canadians and Americans portrayed these movements as non-partisan and ecumenical.

1862-63 Food Shortages and Canadian Response

From 1860 to 1863 a series of natural disasters limited the production of potatoes, grain, and hay in Ireland. Torrential rain compounded the problems of the poor crop yields, crop failures and leading to a significant loss of cattle. "Great distress, especially in the west," according to Helen Hatton, (1993,239) "was further exacerbated by the lack of fuel, as peat could neither be cut or dried." In 1862, the Canadian press reported that "the amount of distress was very great." (Toronto *Globe*, 28 May 1862) According to the Kingston *British Whig(*.28 April 1862) "the destitution then existing in the west of Ireland" required immediate relief to help "the famishing poor of Ireland." (*British Whig*, 28 April 1862) Similarly, the Quebec *Morning Chronicle* (11 February 1862) told it readers of a "very great and general distress exists amongst the poorer classes in the west of Ireland." In response to the repeated crop failures, Irish religious, medical, cultural, and civic leaders created the Central Committee for the Relief of Distress in Ireland in Dublin on 24 January 1862, chaired by the Lord Mayor of Dublin John Vereker, to solicit local and international aid. By 1863 major food shortages developed in Ireland. Furthermore, the American Civil War negatively impacted manufacturing in the north of Ireland putting many cotton spinners out of work and producing hardships for the urban working class similar to the distress of Lancashire textile workers in England. The British government also sent out appeals to Canadians and Americans to help both the Irish and Lancashire workers. Irish Canadians looked at horror that "again a loud wail come to use from across the sea, and

there are sad tidings from Ireland," (Toronto *Irish Canadian,* 18 February 1863). Canadian newspapers, like Halifax *Sun* (20 March 1863) reported on the continued distress in Ireland. According to Bishop Rev. Gillooly of Elphin "a large class of farmers who were free of distress last year are in almost extreme distress." Another Halifax paper, *British Colonist,* (10 March 1863), confirmed "deficient harvests had entailed considerable distress on laborers, small farmers, and shopkeepers." In April 1863, the New York Irish Relief Committee reported that "in one manufacturing district alone, over nine thousand persons have been…without employment, and are now suffering a degree of wretchedness, the details of which are harrowing." (New York *Times,* 3 April 1863) Reports from the Mansion House Committee in Dublin concluded that between February 1861 and February 1862 pauperism increased forty-five percent in the county of Armagh, Ulster. Due to the American Civil War all of the province of Ulster "is now suffering severely from effects" of the American conflict (*Report,* 1864, A29).

Voluntary committees were formed in the United States and Canada in 1862-63 to assist the Irish and Lancashire workers. Unlike 1847 or 1880 provincial governments in Canada did not vote appropriations for Irish relief in 1862-63. In Nova Scotia, Quebec, New Brunswick, and Ontario committees formed to assist the English workers in distress and to alleviate the growing misery in Ireland in 1862-63. This became a people-to-people movement. Some Irish Canadians resented the attention paid to the Lancashire Operatives compared to the starving Irish. To Canadian Irish, "the heartless apathy displayed by the English government in relation to the present deplorable condition of Ireland, is not only a disgrace to the age, but a hideous blotch upon the fair face of humanity." (Toronto *Irish Canadian,* 13 May 1863) In the opinion of the *Irish Canadian* "the Celtic family is altogether ignored, though the Irish are by far the most numerous in all the England's colonies." (11 March 1863) Bitter at the English focus on Lancashire workers, *Irish Canadian* added: "Is it not mockery, then, to talk of distress in Lancashire, whilst a chronic distress is withering and destroying all the vital energy in Ireland?" (11 March 1863) One of the realities for the United States and Canada were competing claims for donations to two worthy causes. Judge Charles Patrick Daly, Chair of the New York City Irish Relief Committee, reluctantly concluded in August 1862 the mercantile community in the city preferred to donate to the cause of the Lancashire workers and refrained from opening their purses for the Irish. However, in both Canada and United States donations flowed more easily to the Irish in 1863 compared to 1862. (Strum, 2015, 19). A theme of aid to Ireland stressed in both Canada and the United States even in the *Cobourg Sentinel* donations "characterizes all classes and creeds in the community in which we live." (*True Witness,* 14 March 1862)

Committees sprang up in Quebec in 1862 to assist the Irish. In Montreal, for example, residents established an Irish relief committee, chaired by Marcus Doheety, that met twice on 24 and 27 January 1862 to solicit donations. St. Patrick's Church raised over 600 pounds.(Montreal *Herald,* 24 January 1862) The Montreal and Quebec Irish relief committees in January and February 1862 repeatedly advertised for donations for Ireland. (Montreal *Daily Witness,* 27 January 1862; Quebec *Morning Chronicle,* 11, 12 February 1862) In both Montreal and Quebec, residents organized ward committees to facilitate collections. In addition, in Montreal citizens could drop their donations off at the Merchants' Exchange, Mechanics' Institute, Mercantile Library, or D.&J. Sadlier & Co. Book Store, as another method to encourage contributions. When Archbishop MacHale, in Tuam, received a second donation from Quebec he wrote "your welcome letter with the magnificent sum of 270 pounds." (*Morning Chronicle,* 29 March 1862) John MacHale, Archbishop of Tuam, received $3,674 by March (Boston *Pilot,* 29

March 1862) Contributions came in from other parts of the province, and were sent to either the Mansion House Relief Committee in Dublin or to the Archbishop of Tuam. By November, the Quebec committee, alone, raised $11,331.02.(Quebec *Gazette,* 5 November 1862) Similarly, in Perth, Ontario the Irish Relief Fund remitted $450 to the Archbishop of Tuam. (Boston *Pilot,* 29 March 1862) Cobourg, Ontario collected $500 "which speaks volume for the philanthropy and feeling of real Christin charity" in the community. (Cobourg *Sentinel,* in Montreal *True Witness,* 14 March 1862) In Kingston, Ontario, Bishop Horan, chaired a public meeting in January at St. Mary's Cathedral, to solicit subscriptions from the citizens of Kingston "to relieve the destitution then existing in the west of Ireland." (*British Whig,* 28 April 1862) Apparently, the Biship of Kingston "was the first to originate the movement in Canada." Over $6,300 was donated and "many Protestant gentlemen" contributed.(*British Whig,* 28 April 1862). Funds collected in Kingston went to the Archbishop of Tuam. The events of 1862 alone represent the widespread support from Canadians for Irish relief. (Montreal *True Witness,* 9 May 1862) In Cobourg and Kingston meetings emphasized contributions from Protestants and Catholics, the ecumenical movement for Irish relief. John MacHale acknowledged "the good Protestants who have so generously joined in this work of charity." He assured the good people of Quebec that the aid would be dispersed "without the slightest interference of religion" to poor Protestants and Catholics. (*Morning Chronicle,*29 March 1862) This provides further evidence that famine relief aid to the Irish in Canada was raised in an ecumenical manner and distributed to the poor, both Catholics and Protestants.

More contributions went to Ireland in 1863, Donations went to the Mansion House Relief Committee in Dublin or to Catholic bishops in Ireland. As an example, the St. Patrick's Literary Institute in Quebec donated fifty-six pounds to Bishop John MacHale in Westport, Ireland "for relief of the distressed." Members of the Charitable Irish Society of Quebec sent twenty-five pounds to David Moriarty, Bishop of Kerry. Writing to Matthew Walsh, President of St. Patrick's Literary Institute, Bishop Moriarty, on 1 June 1863, blessed the Canadians for their donation "for myself and the poor people of the Diocese" and expressed "the most sincere thanks for your generous contribution." (Montreal *True Witness,* 26 June 1863; Halifax *Morning Sun,* 29 June 1863) Irish relief committees to Quebec and Montreal solicited donations from residents, as they did in 1862 and sent the donations to either the Mansion House relief fund or the Catholic bishops of Kerry, Tuam, Dublin, or Elphin.

People in the Maritime provinces joined in aiding Ireland. Bishop John Sweeny of Sainit John, New Brunswick informed Paul Cullen, Archbishop of Dublin, a member of the Central Committee, in April 1863, collections amounting to $1,700 in Saint John came primarily from "Irish Catholics, from every quarter of Ireland." (*Report,* 1864, 36-37) Impressed by "the heart-rendering accounts given in the Irish papers of the distress which the poor people are suffering in many parts of Ireland," (*Report,* 1864, 36) Bishop John Sweeny encouraged parishioners "to help alleviate this distress. "He asked members of Society of Saint Vincent de Paul to collect contributions. Various societies in Saint John, like Butcher's Society and the Volunteer Engine Company liberally sent in funds for the Irish. In addition to funds from Saint John, Sweeny sent donations raised in St. Stephens of $206 in a town down the coast from Saint John. The city of Portland raised $1,700 "chiefly in small sums" (Saint John *Morning Freeman,* 30 April 1863) representing the reality that donations came from average residents, Catholic and Protestant, and not necessarily from the wealthiest members of the community. In addition, as a local newspaper highlighted: "It is well known also that private remittances of the Irish to their friends and relatives are so constant

and so great" (*Morning Freeman,* 30 April 1863) that alone "fully discharged their duty to their suffering fellow-countrymen." Irish residents of Canada were more able to give in 1863 and 1880 than in 1847. Most contributions for the Irish came at public meetings in major cities that were ecumenical and non-partisan without distinction of ethnicity, denomination, social class, or political party.

In Halifax, the press as elsewhere in Canada and the United States, encouraged citizen participation and reminded readers of the success of the campaign for the Irish. As the Halifax *Sun* observed, "the subscriptions to the Irish Relief Fund are progressing very favorably." (1 June 1863). The Charitable Irish Society led the way and established ward committees to collect donations from Protestant and Catholic citizens. As Jeremiah Conway, President, reported to Archbishop Paul Cullen in Dublin and a member of the executive board of the Mansion House Committee, and John Vereker, Chairman, on 11 June 1863 contributions came "from citizens of all denominations." (Conway to Vereker, *Report,* 1864,43; Conway to Vereker, CIS, NSA). Other groups donated, including Society of St. Vincent de Paul and the men of the 2nd Batt, 17th Regiment. (Halifax *Morning Sun,* 20 May 1863) Members of the Charitable Irish Society not only collected funds but also donated from their own coffers "for the suffering poor of Ireland." (CIS Minutes, 19 May 1863). The people of Halifax embraced the cause of Ireland in 1863. Conway informed Bishop Paul Cullen of additional contributions on 20 August 1863, including donations from Halifax, Dartmouth, and Yarmouth, on the southern coast of Nova Scotia. (Conway to Cullen, Dublin Catholic Archives). Although food shortages appeared to end by 1864 some areas still had local problems and the Charitable Irish Society continued to send money to Irish bishops into 1867.forwarding to Cardinal Cullen in Dublin to help "with the distress which at present exists in Ireland." (Bowes Daly to Cardinal Cullen, 4 July 1867, CIS)

Toronto actively participated in famine relief in 1863, John Bowes, Mayor of Toronto, led the local famine relief committee. In early June residents held a meeting in the Music Hall "in aid of the distress of the Irish poor." An article in the *Irish Canadian* emphasized that "all religions and nationalities were fairly represented." Of the donations subscribed at the meeting "three quarters of the sum…was given by liberal Protestant gentlemen." (10 June 1863) As in Nova Scotia and New Brunswick, meetings and groups involved in famine relief in Canada stressed the ecumenical nature of famine relief. Mayor John Bowes pointed out in his address: "We had assembled here, representing every class and creed of our fellow citizens" to help the Irish, just as Canadians of all classes and creeds donated to the Lancashire workers. (Toronto *Globe,* 3 June 1863), once again, making it clear that Canadians of all classes and denominations aided both the British operatives and the distressed Irish. To make this point further, both the Anglican bishop of Toronto, Dr. Strachan, and the Catholic bishop, Dr. Lynch, spoke at the meeting. As another paper concluded "men of all denominations and origins took part in the good work." (Montreal *True Witness,* 12 June 1863) The meeting established ward committees to collect donations and issued an appeal to other towns in Ontario to create local committees. Average citizens of Toronto donated, like Mrs. Sullivan who sent $4 and Mrs. Brown who gave $5, Toronto's committee sought individual or municipal donations in money or produce to send to Ireland. As an example, the treasurer of the township council in Chatham forwarded a contribution to the Toronto Irish Relief Fund. (*Irish Canadian,* 29 July 1863) Members of the Toronto committee sent funds raised to Mayor John Vereker in Dublin. Vereker thanked Mayor Bowes for "the substantial expression of sympathy for the distressed poor of this unfortunate country." (*Irish Canadian,* 2 September 1863).

Mayor Vereker wrote several times to Toronto's mayor to acknowledge Toronto's subscriptions "to aid the distressed poor in Ireland." (Quebec *Daily Mercury,* 5 September 1863).

British Operatives

A primary reason Canadians did not contribute more to Irish relief in 1862-63 was the people of Canada donated to two international crises in 1862-63, the second one became the British Operatives' Relief Fund for workers in Lancashire and Cheshire displaced by the "cotton famine" created by the Union boycott of southern cotton. Efforts in Canada began in September 1862 and in some Canadian communities, like Halifax, extended to July 1863. As with the Irish food shortages the Canadian press, like the Quebec *Morning Chronicle,* reported on the "severity of the distress in Lancashire." (15 January 1863) Echoing the concerns and expectations of Canadians, the Montreal *Gazette* (17 September 1862) assured its readers the British Operatives' Relief Fund distributed aid "to all the operatives in the United Kingdom who are suffering the consequences of the 'Cotton Famine' without distinction of origin, creed, or locality."

One Canadian legislator noted "the liberality of the country in contributions to the relief of the operatives of Lancashire." (Quebec *Gazette,* 25 February 1863) Efforts to raise funds included a concert on 7 March 1863, which according to the committee's secretary Joseph Gibbs raised one hundred pounds. Previously, in October 1862 H Scott chairman of the Quebec committee, divided Quebec into districts with local committees soliciting donations. (Quebec *Morning Chronicle,* 31 October 1862) Montreal established a relief committee that raised $24, 666 by the middle of October 1862, and when it closed its books on 1 June 1863 it sent a total of $32,735.28 to England. (Montreal *Herald,* 4 June 1863) Charlottetown, Prince Edward Island created a committee headed by the town's mayor and sent two hundred pounds to London. (Toronto *Globe,* 20 January 1863) Toronto held several meetings in 1862 for operatives 'relief. On 21 January 1863, Toronto's mayor chaired a successful meeting and entertainment, sponsored by the city's butchers, who had donated funds and $900 worth of beef to the Lancashire operatives. According to the Toronto *Globe* (22 January1863): "The hall was well filled, the fair sex forming a large proportion of the audience." Members of the local committee collected large subscriptions in Toronto but also welcomed "our friends in the United States joining so heartily in the relief movement, (Cheers)" This provided further proof that the causes of Lancashire workers and Irish food shortages led to widespread mutual support in the United States and in Canada in 1862-63, By January 1863, the Toronto committee collected $19, 279,22 (*Globe,* 22 January 1863), and New York City committee $265,000.

Meanwhile, in Halifax, Mayor Philip Hill, chaired the local relief committee, and informed the Earl of Derby in London on 22 January 1863 that a recent donation of 1,000 pounds sterling came "entirely from the rural districts of the province,there scarcely a village or a settlement, however remote, that has not expressed sympathy with our suffering fellow subjects" and donated to the Lancashire workers. (Halifax *Morning Sun,* 9 March 1863) Responding to this generous donation John Maclure, Secretary of the Central Executive Committee in Manchester, expressed the gratitude of the committee to "the inhabitants of the rural districts of the Province of Nova Scotia, for their liberal donations, and to state how fully their noble efforts are appreciated." (*Morning Sun,* 9 March 1863) Contributing to the Lancashire workers became a national cause, and when the communities of Guysboro and

Cape Canso gave relatively small amounts, the local secretary L.W. DesBarres apologized explaining “the people here are poor, and this season is a very hard one.” (Halifax *Morning Sun*, 22 January 1863) The Halifax press listed everyone who subscribed to Lancashire relief (Halifax *British Colonist*, 7 March 1863) and when it closed its books Nova Scotians donated $27,750,38. (Halifax *Acadian Recorder,* 11 July 1863) The comments from Nova Scotia suggested how widespread aid for the Lancashire workers became in Canada in 1862-63, and the moral obligation everyone felt to aid the workers in England, another example of Canadian philanthropy in international crises that needs further exploration.

Conclusion

This article fills a gap in Canadian historiography by looking at certain aspects of Canadian international philanthropy, an understudied area of Canadian history. Studying both Canadian aid to Ireland in 1862-63 during the food shortages of the period and efforts to aid the workers of Lancashire in England suggests areas for further research, and the extensive role Canadians played in foreign crises during the nineteenth century. Unlike 1847 or 1880 when some provinces voted public appropriations for Ireland aid in 1863-63 to both the Irish and Lancashire workers remained a people-to-people movement similar to the voluntary philanthropy in the United States. The press reported on the problems in Ireland and England and encouraged public meetings to raise funds for the starving Irish and the impoverished English workers. Newspaper editors served a public service role in Canada and the United States by reporting the problem, emphasizing the need to help, publishing the accounts of the meetings and often individual contributions. Meetings and the press stressed the magnitude of the crises, Christian charity, humanity, and the need to help fellow British subjects. Americans also justified aid to Ireland because Americans were a people of plenty living in the granary of the world---something Canadians rarely said about Canada. While Canadians talked about helping fellow British subjects Americans argued that republicanism required Americans to help those in need in Ireland and England. Speakers at public meetings, organizers of aid, and the press in the cases of Irish aid and Lancashire assistance noted that Canadians of all social classes, nationalities, and denominations donated An essential theme emphasized by Canadians and even reported by the Archbishop of Tuam that Canadians gave without distinction of religion, and Irish religious and secular leaders distributed aid to poor Protestants and Catholics. Also, in the case of the Irish, in both Canada and the United States, separate from public meetings Irish Canadians and Irish Americans sent remittances of $5 to $25 to family and friends in Ireland, a sometimes-underreported aspect of aid to Ireland, whether in 1847, 1863, or 1880. Also, reports in the press indicated that rural communities in Nova Scotia actively supported helping the British operatives---reflecting the widespread approval of aid to the Lancashire workers and to the Irish, further evidence of the need to analyze the role of Canadians in international philanthropy. Four times in the nineteenth century Canadians and Americans helped the Irish. Writing in 1890 the Toronto *Globe* concluded due to another round of food shortages, “private contributions from this side of the Atlantic could be turned to good account” (11 October 1890) in the west of Ireland. Archbishop Gillooly informed a bishop in Manitoba in November 1890 voicing his concern that in several parishes in his diocese “great distress will soon prevail owing to the failure of the potato crop’ hoping for contributions from Manitoba. (Gillooly to Tache, 4 November 1890, St. Boniface) Canadians responded with the same generously as they did in 1847, 1863, and 1880. In 1862-63, political, religious leaders, and newspaper editors expressed pride in the benevolent behavior of the people of Canada in providing aid to the

Irish and Lancashire workers. Public opinion leaders compared Canadian international philanthropy favorably in relation to the United States. This widespread and extensive aid to the Irish and Lancashire workers provides us with another way to look at how Canadians responded and interacted with the outside world and the values of charity and compassion held by the Canadian people.

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Motivation and Self-Care Intervention for Pre-Service Educators: Ready and Resilient

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Abstract

Pre-service teachers and school counselors complete their final student teaching and internship experiences while simultaneously juggling demanding coursework and personal responsibilities. These field experiences require full immersion and the management of a classroom or caseload under the supervision of a credentialed professional. Because this rigorous preparation is necessary to build competence and workplace readiness, this paper focuses on a proactive two-part intervention designed to support preservice educators during their fieldwork. Part One equips participants with motivational strategies, discussions of fieldwork challenges, self-care instruction, burnout prevention, and resilience training. It also provides tips for effective time management, improved communication, and relaxation techniques. Part Two involves ongoing check-ins, progress assessments, sharing best practices during small group work, and mindfulness training. The piloted intervention yielded highly positive results, demonstrating reduced burnout, increased self-care practices, higher motivation and self-efficacy, and improved relationships with peers and faculty. This model is recommended for educator preparation programs to ensure candidates receive quality training while safeguarding their mental health. Ultimately, the intervention's key benefits—preventing burnout and maintaining motivation and resilience—are crucial for retaining high-quality educators and counselors in our schools.

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Introduction

Pre-service educators are faced with multiple challenges as they become immersed in student teaching, practicum, and internship experiences. Field experiences are often reserved for the end of students' programs of study, when they have completed ample preparation to be ready for the real world of teaching and counseling in actual school settings. Student teachers are often required to spend the entirety of each work week in their field placements throughout one to two semesters, while attending courses in the evening or virtually. Similarly, school counseling interns also spend most of the work week in their field sites for two to three semesters and complete seminar and other required courses in the evenings or online.

The pre-service educator is therefore a novice maintaining many of the responsibilities of a full-time professional while attending college or graduate school on a full courseload. The risk of burnout in this type of weekly schedule, although it is often for one or two semesters, is alarming. Much talent may be lost due to the rigorous schedule, which can be a cause of stress, anxiety, depression, panic, burnout, or worse outcomes. It is particularly concerning when pre-service educators do not feel adequately supported during these intensive experiences, because this can propel them into reconsidering career choices and, in some cases, may lead them to decide to leave education entirely (Bovee, 2024; Khalifa, 2023; Um & Nam, 2024; Wang et al., 2026).

To combat these concerns, college professors of Education and Counseling collaborated to develop a proactive, preventative two-part series to provide mental health tools and support for pre-service educators during their semesters of fieldwork. In addition to being assigned to a highly credentialed and seasoned mentor on site, students attend a weekly seminar course when they are enrolled in both student teaching and school counseling internship courses. During this seminar experience, group supervision is provided, and additional skill sets are practiced. Rigorous feedback exchange occurs, with faculty instructors taking the lead on providing exercises on classroom management, lesson planning, and leading classroom guidance sessions. This seminar can be an extraordinary experience that supports and encourages the pre-service educator (Bishop & High, 2023).

Faculty instructors invited a mental health professional into the seminar to provide enhanced social and emotional support for teachers and counselors in training. The result was a two-part burnout prevention workshop series, which will be described herein in further detail. The two-part plan was piloted over the course of two semesters, giving one-year residents of student teaching and counseling interns who intern for at least two semesters a consistent and robust anti-burnout package, aimed at building their strengths and supporting them in a scaffolded constructivist approach during times of high workload demands and challenges. The preliminary results offered a promising antidote to a stressful year of field experiences. Students reported experiencing significantly less stress in semester two after participation in the two-part series. They pointed to skills such as acknowledging the need to ask for help and gaining skills in communicating that need to mentor faculty and on-site supervisors, which was liberating and game-changing for them. Other strong outcomes included their improved skills in time management and resilience, leading to stronger self-efficacy.

Two-Part Intervention Plan

Research Literature Background

The concerns of burnout among educators has been documented across numerous research studies. Lee and Garwood (2025) conducted a phenomenological study to investigate the specific stressors of special education teachers due to their unique and sometimes ambiguous roles and an abundance of required documentation. Following the COVID-19 pandemic, educator and counselor roles changed dramatically, requiring additional skill sets that compounded responsibilities without necessarily offering supervision or compensation. Teachers and counselors, particularly those who are novices and those in pre-service training programs, are charged with expanded duties and less time to obtain adequate training and to perform their responsibilities on demand. These changes have added to already stressful conditions for many educators (Bishop & High, 2023; DeDiego et al., 2023; McCoyd et al., 2023; Qin et al., 2025). Merculief and colleagues (2026) described the education profession as deficient in terms of employee support systems and cited the particular dangers of burnout for marginalized groups, emphasizing issues of equity and opportunity for education professionals from specific racial and ethnic backgrounds. Stein and colleagues (2024) conducted survey research to point to the need for systemic support for early childhood educators who were deemed at risk for burnout. Lu and colleagues (2023) explored the experiences of burnout in vocational counselors and emphasized the benefits of mindfulness as well as treatments for counselors experiencing burnout. Another highly relevant study in this area was conducted by Bardhoshi and Um (2021), which indicated that both caseload and the perception of support in one's organization were predictive of burnout levels in school counselors and furthermore highlighted self-efficacy as a key preventative indicator. The risks for burnout and workplace stressors are clearly present in pre-service education and counseling programs, furthering the potential for attrition of some of the most talented and promising professionals before they fully enter these professions. Bishop and High (2023) linked counselor well-being to the feelings of connectedness they experienced in the workplace and the support systems they were offered to lower levels of burnout and stress. Bovee (2024) also linked stress, resilience, and burnout in a study of counselor leaders. These studies not only support the need for further investigation on factors that may prevent burnout in pre-service educators but also indicate that any prevention program should highlight the development of skills in resilience and self-efficacy while enhancing system support in educational and counseling organizations. The faculty and clinician who developed the two-part intervention below considered the depth of research on this topic and aimed to include development of internal and external protective factors to reduce burnout in pre-service education professionals. It is hoped that these gains could carry on into their professional careers and enhance retention of high-quality educators and counselors who place priority on their own mental well-being and self-care.

Overview and Sample

The field experience for pre-service educators provides pre-service educators with tools to prepare for taking on their own clients/classroom. This experience teaches lesson planning, classroom management, time management, and questioning and presentation skills. It helps to build experience, practice, and provides regular supervision, debriefing, and constructive criticism. It also helps future teachers and counselors to obtain peer feedback exchanges, multiple tiers of observation, and builds confidence and self-efficacy. Student teaching and internship

courses require immersion in the chosen field of study and management of one's classroom or caseload under the supervision of a credentialed professional, i.e. a practitioner teacher or school counselor within a K-12 school. Supervising faculty at the college level provide seminars for refining skills, debriefing, and developing new skills for teachers in lesson planning and evaluation and for counselors in classroom guidance and action planning. The rigor of the preparation is necessary for pre-service educators as they develop competence and confidence in their profession and workplace readiness (Gray & O'Rourke, 2026). The "burnout prevention" intervention plan was piloted in 2023-2024 in an educator preparation program and yielded positive results. Fifty pre-service education students, 35 undergraduate student teachers, 5 graduate student teachers, and 10 graduate school counseling interns were included in the sample. They attended a small, metropolitan, private university in New York, within its college of education. Their ages ranged from 20 to 50. The sample was predominantly female, with only 10% being male. The sample was predominantly White, with only 10% being Black, Latino, or Asian.

A clinical mental health counselor with 20 years of counseling experience facilitated a two-part workshop to offer student teachers and counselor interns tools and techniques for stress management, self-care, time-management, relationship-building, improved communication, and relaxation. The intervention allowed the participants to debrief about their current stressors while developing positive skills that build upon individual strengths. The intervention positively impacted participants' perceptions, resilience, and self-efficacy. Participants engaged in a variety of stress management and self-care activities to directly practice the skills that would positively impact student teacher and counselor trainee resilience. Participants practiced deep breathing exercises, guided imagery and mindfulness techniques, and received writing prompts for short journaling activities. Additionally, participants worked in small-groups to practice active listening and reflection, team-building and mentoring/peer-support skills, and to discuss and brainstorm about effective time-management and communication skills. They engaged in these activities while being offered space for discussion about best practices in alleviating stress and reinforcing confidence in teacher/counselor preparation programs. The benefits of such interventions has been documented in research studies indicating the importance of collaborative relationships and mental health to increase resilience and reduce burnout (Garwood, 2023; Gray & O'Rourke, 2026). The participants were also reminded of institutional resources available to them, including a college advisor, certification officer, and numerous supervising faculty, instructors, mentors, and peer tutors.

Methodology and Procedures

Part One

Six psychoeducation sessions were delivered during the first semester of field experience. These two-hour sessions were delivered by a clinical mental health counselor every other week during the four-month semester. Topics for the six sessions included the discussion of personal stress factors, both personal and academic; identification of stress, trauma, and attrition risk factors; time-management skills, supervision and mentoring processes; collaboration, peer-support, and teaming; tips for self-care; and resilience training. Resilience training teaches about adapting to difficult situations, overcoming setbacks, and coping with stress. Some examples of resilience training include psychoeducation, cognitive behavioral therapy (CBT), mindfulness and meditation, gratitude, relaxation, journaling, and goal setting. Embedded in all six sessions was an emphasis on recognizing and seeking

out opportunities for supervision/consultation and modeling of best practices from field and faculty supervisors and utilizing self-care practices regularly. The large psychoeducation group was designed as a classroom guidance model, and the large group sessions were supplemented with smaller group activities aimed at practicing time-management skills, recognizing personal stress and burnout risk factors, and help-seeking and self-care role-playing. The session leader prioritized the following themes during semester one: motivational strategies, discussion of fieldwork challenges, enrichment, and professional development. Within the area of professional development, the following areas were highlighted: instruction on self-care, burnout prevention, resilience training, time management, improved communication, and breathing/relaxation techniques.

Part Two

An additional six psychoeducation sessions were delivered by the clinical mental health counselor during the second semester of field experience, with the same frequency of every other week for a two-hour session during the four-month semester. The six group session themes in this unit included self- and peer-evaluation conducted in smaller groups to gauge the successful integration of learned strategies in individual practices; review of self-care, breathing, and deep-muscle relaxation activities; review of resilience training; creating additional peer and supervisor support systems; establishing mentoring relationships for those who were interested; and conducting ongoing evaluation of their programs and availability of self-care resources. The large classroom guidance sessions were again supplemented with small group activities to practice relaxation, journaling, and self-care tools. The main themes for this segment of the intervention included review of skills learned in Part One, check-ins, debriefing about challenges, assessment of progress, sharing about best practices, small group work, and meditation/mindfulness training.

Preliminary Results

A mixed-methods but primarily a qualitative exploratory approach was utilized in conducting the study and in analyzing data to evaluate the effectiveness of the two-part intervention plan. Data from semi-structured brief interviews conducted at the end of each semester indicated a marked reduction in reported stress, particularly after having completed the classroom guidance sessions in Part One and again at the end of Part Two. The 50 participants each reported a reduction in their perceived stress levels following active participation in Part One and Part Two of the intervention. It is notable that despite the added responsibilities assigned to the students during semester two, they still reported overwhelmingly reduced levels of stress at the conclusion of Part Two, when compared to the start of semester two and the start of semester one. During the interviews, students were asked to rate their stress levels from one to five, with five being the highest level or very high. At the start of Part One, 80% of students reported stress levels of 4 or 5. At the conclusion of Part One, that figure was reduced by half with only 40% of the participants reporting a stress level of 4 or 5. At the start of Part Two, 50% of participants reported stress levels of 4 or 5, and at the conclusion of part two, this number was reduced to approximately 20%. The interview responses also revealed that reports of very high stress and burnout were often accompanied by a reported sense of feeling overwhelmed or helpless and by a lack of professional preparation, insufficient support from supervisors/faculty, or limitations on personal leisure time. Participants indicated both at the end of Part One

and at the end of Part Two, that participating in the psychoeducation intervention either better informed them of self-care options or encouraged them to engage more frequently in self-care practices. Interview responses at the conclusion of the program indicated reduced burnout, increased self-care practices, higher motivation, higher self-efficacy, improved relationships with peers and faculty, and academic success in fieldwork courses. Overall, students also performed at very high levels academically in fieldwork courses, with all students earning an A, A-, or B+ as a final grade in each semester of field work. The analyses indicated three relevant themes following both parts of the intervention, at the conclusion of Part One and Part Two, pointing to the importance and/or effectiveness of: 1. the self-care skills and resilience training and time-management lessons; 2. helpful relationships and communication patterns established between student and faculty; and 3. lessons identifying faculty/counselor supervisory resources. These three aspects of the intervention were referred to as the most beneficial in aiding retention and preventing burnout for the pre-service educators.

The Biggest Challenges Revealed

The interviews, when examined in greater detail, also delineated some of the greatest challenges that pre-service teachers face during their field work experiences. They indicated that managing coursework and field experience/time management posed a strain on personal time and self-care. They also struggled with new and expanded responsibilities, navigating a new environment with new rules, and getting to know new people, new supervisors/cooperating teachers, and students. Because of the timing of the field work semesters, they also had to prepare for important credentialing exams, which is a high-stakes and high-stress endeavor requiring preparation outside of their academic course program. During fieldwork courses, students keep detailed records and logs and frequently multitask, striving to balance academic preparation and personal life. They also face the new challenge of receiving feedback from multiple sources, taking them out of their comfort zones and accepting feedback that they may not be used to doing. They are also faced with serving different ages of students, from diverse backgrounds, and of diverse cognitive ability levels. This experience is rich and challenging at the same time, teaching them to become lifelong learners.

Limitations

There were several limitations to this study, particularly its small convenience sample and a design limiting generalizability. The sample was not very diverse and was not representative of the target population of pre-service education majors. The pilot study did have numerous flaws in data analysis of the end-of-semester interviews, although attempts were made to triangulate data based on final grades in the courses and feedback from faculty instructors. Self-reporting is another concern because the responses might have been more authentic in a strictly anonymous survey or questionnaire-style responses. The non-experimental, exploratory qualitative design was prohibitive because it eliminated the possibility of concluding with any true cause-effect relationship data. Numerous extraneous and confounding variables also limit how much can be said about the effectiveness of the intervention, but based on interviews, the intervention does seem promising and warrants a full experimental, empirical study. The short-term and long-term impact of the two-part intervention is unknown. Therefore, follow-up interviews would be needed and a replication study recommended in a more quantitative, experimental design

to properly establish internal validity and generalizability. Additionally, it is recommended that pre-made instruments with documented validity and reliability be utilized in the future to determine burnout rates, attitudes, as well as satisfaction with the field experience elements.

Discussion and Implications

The results of this pilot study reveal the importance of burnout prevention in preservice educators. Student teachers and school counseling interns face numerous stressors during their last year of program preparation for their respective professions. They are challenged by a rigorous presence in the field while completing other academic courses and simultaneously preparing for difficult credentialing examinations. The stress of this experience can sometimes minimize the benefits of the learning experience by causing unnecessary anxiety, depression, and burnout. The pilot program described above is a proactive plan to combat burnout in our newest educators, prompting them to prioritize mental health and self-care, while strengthening communication and writing skills that will enable them to be successful in the workplace. The goal of the pilot program was to increase retention and improve the well-being of pre-service teachers and counselors so they can fully experience a rich field experience that reinforces their roles as ethical, culturally competent, and conscientious educators. The tools provided in the two-part intervention plan expand professional development, improve communication with peers and supervisors, and encourage help- and support-seeking when needed. The pre-service educators learn the difficult and delicate skill of work-life balance, engaging in regular self-care exercises, multitasking, calendar planning long-term projects, time management, practicing activities like mindfulness and meditation, and building skills in resilience during times of hardship and challenge. The pre-service educators are taught to utilize their strengths to improve their performance while optimizing their own mental health and ability to communicate effectively and build rapport with others. The data analyses are still in preliminary stages but warrant further investigation. Furthermore, a replication study is recommended with a larger and more diverse sample that accurately represents the body of pre-service teachers in the region. A quantitative, experimental design is recommended for a replication study. Follow-up interviews at least three months after the field experience and focus groups of supervisors are also suggested to gather deeper insight into the most beneficial aspects of the program. Furthermore, educators are encouraged to employ teaching strategies to help pre-service educators master threshold concepts such as lesson planning and developing group protocols to build confidence. Tutoring and mentoring, triangulated assessment methods, peer collaboration and teamwork, and frequent exchange of feedback are also recommended as best practices for pre-service educators. Independent enrichment and extended practice are also viable options for students who are eager to gain more intensive experiences and focus on specialization areas or badges. Faculty instructors of field work courses are reminded of strategies that build rapport and improve academic performance, while improving self-efficacy and classroom culture and climate, such as well-structured and engaging lessons, scaffolded assignments, individual advising and Q&A sessions, regular communication and differentiated instruction, and student-centered in-depth discussions to optimize the seminar experience (Bardhoshi & Um, 2021; Vieira et al., 2024). On a systemic level, educational organizations should consider additional ways of minimizing stress and burnout for pre-service teachers and counselors, perhaps with consideration of the timing of fieldwork with other major program obligations, caseload and courseload, and the necessary programmatic supports, peer engagement, and interactive experiences that can be protective factors.

Conclusion

The two-part “burnout prevention” intervention plan is recommended for sustaining quality preparation for pre-service educators while prioritizing mental health and resilience. Although the pilot design was somewhat weak and limited, it clearly demonstrated strong outcomes for pre-service educators. A replication study is highly recommended and further research is needed, but such a plan has the potential to be greatly beneficial for maintaining motivation and increasing retention of high-quality educators and counselors in the profession. The risk of burnout in pre-service and novice educators is often overlooked and the research on the topic does not provide ample solutions for a long-standing problem. The post-pandemic changes in school systems highlighted the need for improved educator training programs. However, while programs have added additional training modules and enhanced curriculum, few have actively sought to address the problems of stress, burnout, anxiety, and depression in pre-service teachers and counselors. Lacking quality support systems, training, and the prioritization of self-care and mental health services causes poorer performance and ultimately lower retention rates of high-quality educators in these professions. Prevention of burnout must begin at the pre-service level, so education professions can provide improved work-life balance and offer better quality of life for novice and seasoned educators. Skills in stress management, resilience, time-management, and self-care will serve to improve well-being not only at the pre-service level but ultimately for many years to come during one’s career in education and counseling (Bishop & High, 2023; DeDiego et al., 2023; Qin et al., 2025).

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Spousal Violence in Police Cases in Puerto Rico, Violence in the Families of Police Officers

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Abstract

This study was designed to explore the relationship between factors related to police work and whether these factors help predict domestic violence in a sample of Puerto Rico Police officers. The following factors were explored in this study: external burnout, alcohol abuse, retirement from the department, and authoritarian spillover. This work was based on a previous study by Johnson et al. (2005), which revealed that exposure to violence and domestic violence among police officers are linked according to four mediation chains. The mediation chain was a model implemented by the authors to determine the influence of burnout, authoritarian contagion, alcohol use, and leaving the department as factors inducing or involved in domestic violence by police officers. One hundred active officers of both sexes, from the rank of agent to inspector and with a minimum of 5 years of seniority, belonging to the police force of the regions of Humacao and Caguas, municipalities of Puerto Rico, agreed to participate. This region was selected due to the increase in population in comparison with the other 13 police regions, as well as the need to have agile and properly trained police officers.

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Background

The problem of domestic violence in Puerto Rico has been documented in several studies. There is insufficient information on the factors that contribute to “spillover” violence in police families in Puerto Rico. This study is a replication of a study by Johnson et al. but applied to a sample of police officers in Puerto Rico. The focus of the paper explored some of the factors affecting the Puerto Rican police force. How is the “contagion” of these stressors transferred to an officer's family? The study recognizes previous experiences and multiple circumstances and work-related stressors that can lead to occasional aggressive behavior.

One of the main situations faced by police around the world, in terms of trust, is related to racial issues, discrimination, and stigmas towards society. How can we establish the issue of trust when what is largely reflected is distrust on both sides due to behaviors that are inherited over time? The most striking issue of social injustice is precisely racial injustice. Unfortunately, it has been characterized by illegitimate or irregular convictions, a situation that becomes a shame and goes directly to the conscience of those who execute it because they do not recognize rights, making them think that it is the right thing to do or perhaps the noble cause of completing a job, which is not grounded (Graham et al., 2022).

One of the fundamental questions to address this type of behavior is the following: How well trained are police officers in human rights? Manning and Vanmaanen (1978) explained that the police were victims of an irrational society. Officers must fight crime to keep the peace, act to control private events, and prevent crime, which involves new forms of crime for which they often have no knowledge, training, or tools to combat. The discussion takes place against the backdrop of police misconduct and metrics to evaluate such conduct with technology, complaints, and many others, which makes citizens lack confidence in the police. The lack of oversight and corrective action is tied to justifications for misconduct. Domestic violence has multiple ways of being interpreted, including physical violence that can cause injuries such as bruises or fractures and even death. In addition, there are types of violence, such as sexual violence and emotional abuse, which can include threats, insults, humiliation, and contempt.

Abuse also involves controlling behavior, such as telling the victim how to act or dress and manipulating the victim's life, and is also reflected in economic abuse, harassment, or stalking. Several cases in Puerto Rico courts related to domestic violence testimonies bring to light that, in some reasons for violent acts, defendants only comment that they do not understand why their partner is upset because her father acted violently with her mother and she never complained, so she understands that it is a correct act of cohabitation. Within domestic violence, society plays a fundamental role in correct behavior, in establishing what is known and what is not known according to the laws and the imposed social order. However, maintaining a society with bullets is difficult; therefore, deviations and upbringing are much to do in the performance of each individual (Sun et al., 2022).

Graham et al. (2022) reported that the 2019 Puerto Rico Police Department domestic violence statistics (for the entire island of Puerto Rico) involved 7,021 complaints. The report also showed 4,344 arrests. Of these arrests, 3,921 were on criminal charges, but only 214 served sentences, meaning that 0.03% of the defendants were serving

sentences. Similar studies conducted by the Puerto Rico Department of Corrections and Rehabilitation between 2013 and 2014 reflected that 605 people were admitted to the prison system for domestic violence, 361 for abuse, 172 for assault, and 233 for threats, reflecting an increase of 40 convicts per year.

The level of detention was mostly medium, and sentences were mostly between 1 and 5 years for the most part. Of the total of 1,556 convicts for all domestic violence offenses in Puerto Rico during 2014, 1,452 were male compared to 104 females, meaning that 93% were committed by males. The Puerto Rico Police showed that the highest number of complaints came from internal affairs, specifically from the Anti-Discrimination Bureau Division. The complete report of the Puerto Rico Police reflects 40 complaints of domestic violence to police officers, of which only six have been investigated; this represented 15% of the complaints. The highest number of complaints was reflected during the months of March and April 2020, when the COVID-19 pandemic lockdown took place in Puerto Rico. The year 2019 reflected a total of 66 complaints of domestic violence, of which 43 were investigated; this represented 65% of the total complaints (Graham et al., 2022).

A family member of a law enforcement officer may recognize some indicators or signs of violent behavior, such as power and control issues. Some of these are requiring the partner to hand over the paycheck, limiting activities with friends, family or outside the home, checking work by leaving it or making phone calls. Other problems for the victim in cases of domestic violence, as stated by Wolf et al. (2003), include fear of repercussion and financial dependence on the perpetrator. What might happen to the children? They can be removed from the home by filing charges of neglectful conduct by Child Protective Services.

The National Law Enforcement Policy Center (cited in Russell and Pappas, 2018) reported that a police department should check to see if a police officer is engaging in domestic violence by engaging in inappropriate activities that interfere with or protect other officers in cases of harassment, stalking, intimidation, witnessing, victim surveillance, and other types of related activities. The Center also recommended that police departments should have a Post-Incident Administrative and Criminal Decisions Division. Administrative investigations and domestic violence issues are needed. If there are consequences, behavior should change; however, if silence and code blue continue to rule, this can be difficult to stop (Russell & Pappas, 2018).

With reference to relationships with coworkers, a sense of loyalty generally develops, which can lead to police officers not engaging with the victim when a partner is reported to be involved in domestic violence, but law enforcement officers did not primarily visualize the incident. Jaffe et al. (cited in Horwitz et al., 2011) indicated that most of the factors are also barriers for police and victims. Felson et al. (2002) drew attention to the fact that victims want empathy from law enforcement officers. Victims will call the police if the perpetrator has a history of violence, injures the victim, uses weapons, or consumes alcohol at the time of the crime. Other less influential factors include age, gender, race, marital status, employment, and education. However, parenting and social stressors are not considered in this research. That is why it was important to explore the possible organizational factors or social stressors that affect or cause incidents of domestic violence among police officers in Puerto Rico. Being a law enforcement officer has to do with decision making, organization, and morality. Ethics, which for the researcher is the science that deals with the study of conduct, is assigned to police officers who have to deal with

the reasonableness of the standards of conduct of the bodies in charge of ensuring the maintenance of public order. Police officers are the bodies in charge of ensuring order and security of citizens with integrity. These elements must be united and work together, acting in the same way, with impartiality, to be an element worthy of wearing the uniform in the service of the municipality, county, state, or nation. Once we talk about the police state of morality, it is to distinguish right from wrong. How does the officer know how to distinguish between the established and the right thing to do and do something outside the law to achieve the right result (Russell & Pappas, 2018)?

Literature Review

Many external factors, or factors that we are not aware of, influence police behavior. Roslin (2015) states that stressful jobs do not generate violent behavior, so the factor to consider should be control. In relation to control, the officer who is violent with the family maintains control, and the violence of a police officer with his family is not a sign of loss of control. Corobo (2014) makes it clear in his study that the existence of Domestic Violence (DV) perpetrated by a police officer is not related to the profile of the officer. It is only admitted in extreme cases of DV that exposure to violence at work could lead to officer perpetrated DV. Anderson and Lo (2010) understand that the personality of police officers is one of authority, and they have little tolerance for those who do not submit to their orders, including their partner when they resist the officer's orders. In addition, it examines exposure to stressful events on the job and how much it influences domestic violence and partner aggression, including negative emotions and authoritarian overflow. Johnson et al. (2005) reflected that exposure to violence and domestic violence are based on the influence of burnout, authoritarian spillover, alcohol abuse, and leaving the department as stressors driving such spillover.

Methodology and Descriptive Statistics

The study is a replication of Johnson et al., 2005 using a sample of active police officers in Puerto Rico. The survey instrument was reconstructed and modified using the Johnson et al., 2005 study and validated using a panel of experts (content validity). The information was collected in 2 of the 13 police regions of the Puerto Rico Police Department, Caguas and Humacao, with due authorization from the Puerto Rico Police Commissioner. The districts used in the study represent on average 30% of the complaints filed on Domestic Violence in the police (2020 data). Ethical considerations: permissions secured from the IRB and the Puerto Rico Police Department.

A total of n=100 participants agreed to participate in the study and 98 of them completed the entire survey. Fifty percent of the participants corresponded to each police region, Caguas and Humacao. The participants were 68% male and 31% female. Three percent of the participants were between the ages of 26 and 35. Thirty-one percent of the participants were between 36 and 45 years of age. 52% of the participants were between 46 and 55 years old. 13% of the participants were between 56 and 65 years of age. Research questions were established on the topic of prediction: Is there a relationship between factors such as alcohol abuse, departmental syndrome, external burnout, and authoritarian contagion of spousal violence, and what are the predictors that best predict violence in police officers?

Results

The results of the study, after collecting data from police officers anonymously, for the question of whether there is a relationship between factors such as alcohol abuse, departmental syndrome, external burnout, and authoritarian contagion of spousal violence, were as follows: Spousal violence and burnout showed a statistically significant relationship. Spousal violence and authoritarian spillover reflected a statistically significant relationship. Spousal violence and alcohol consumption showed a statistically significant relationship. Spousal violence and departmental withdrawal reflected a statistically significant relationship. In all of the above cases, the correlations obtained were moderate and positive, with the exception of authoritarian spillover.

The content summarized as Relationships between spousal violence and predictors is presented in Figure 1.

Results of bivariate correlations (r Spearman correlation coefficient) between the scales of the questionnaire in relation to violence exposure and spouse violence

		Total Violence	Total Spouse Violence
Total Burnout Scale	Correlation Coefficient	.031	.402**
	Sig. (2-tailed)	.766	.000
	N	97	97
Total Authoritarian	Correlation Coefficient	.087	.236*
	Sig. (2-tailed)	.396	.020
	N	97	97
Total Alcohol	Correlation Coefficient	.198	.399**
	Sig. (2-tailed)	.052	.000
	N	97	97
Total Withdrawal	Correlation Coefficient	.054	.444**
	Sig. (2-tailed)	.598	.000
	N	97	97

Note: *. Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed).

Figure 1. Relationships Between Spousal Violence and Predictors

In relation to the research question, what are the predictors that best predict violence in police officers? A regression analysis was performed consisting of the independent variables “Retirement”, “Alcohol”, “Authoritarian Spill”, and “Exhaustion” entered into the regression equation to predict the dependent variable Spousal Violence. The regression model shows that the variables as a whole have a significant relationship with the dependent variable, i.e., the overall regression is statistically significant.

In addition, withdrawal syndrome was the strongest predictor of spousal violence, followed by burnout and, lastly, alcohol abuse. The only scale that does not appear to be predictive of spousal violence is Authoritarian Spill over as a whole.

The content summarized as Withdrawal syndrome strongest predictor of spousal violence is presented in Figure 2.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.189	4	1.547	11.681	<.001[b]
	Residual	12.187	92	.132		
	Total	18.376	96			

a. Dependent Variable: Total Spouse Violence
b. Predictors: (Constant), Total Alcohol, Total Authoritarian, Total Withdrawal, Total Burnout Scale

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	2.771	.381		7.265	<.001			
	Total Authoritarian	-.001	.043	-.002	-.018	.986	.196	-.002	-.002
	Total Burnout Scale	.168	.070	.230	2.395	.019	.406	.242	.203
	Total Withdrawal	.164	.041	.360	3.948	<.001	.478	.381	.335
	Total Alcohol	.183	.079	.207	2.306	.023	.348	.234	.196

a. Dependent Variable: Total Spouse Violence

Figure 2. Withdrawal Syndrome Strongest Predictor of Spousal Violence

Findings

The analysis of the study concludes that alcohol plays an interesting role in the violent behavior of Puerto Rican police officers. Using the study by Johnson et al. (2005) as a comparison, they found no relationship between violent behavior and alcohol consumption, however, 1/3 of the participants in their sample reported problems with alcohol. While in Johnson's study alcohol was not related to spousal violence, in the current study by the Puerto Rican police it is. In other words, higher alcohol consumption may lead to a greater likelihood of spousal violence. Both studies show that fatigue (r=.402**) and authoritarian spillover (r=.236*) are correlated with spousal violence. Within the findings we should see that the total withdrawal variable (r=.444**) was the strongest correlation found with spousal violence.

Both studies highlight the importance of psychosocial and behavioral factors in understanding violence, whether spousal or in general, in the context of policing. While this study on the Puerto Rican Police focused on the direct prediction of spousal violence from individual variables, the study “Violence in Police Families (Johnson et al., 2005)” delves into how these variables may mediate the relationship between exposure to violence and spousal violence. The combined results suggest that although certain factors such as burnout and authoritarian spillover are important, their influence on spousal violence may be indirect and mediated by other factors, rather than directly predictive. The lack of significant coefficients in the Johnson et al., 2005 study suggests that the relationship between these variables and violence is complex and possibly mediated by other factors not considered in the research.

Conclusions

The recommendations are based on the findings of the study, which examines the perspective of creating a public

policy that helps address spousal violence. We set forth the creation of a comprehensive policy model, which aims to eradicate or minimize spousal violence among police officers by prioritizing prevention, early intervention, and victim support. By addressing the underlying factors and fostering a culture of respect, we aspire to build healthier police forces and safer communities. Training and transition into civilian life for police officers must be expanded to effectively manage retirement. This should begin early in a police officer's career and include the officer's immediate family to help them learn about ways to transition to civilian life. This enhanced approach will incorporate interactive sessions, contemporary case analysis, and simulated practices to strengthen officers' skills and understanding in handling domestic violence situations. The goal is to establish a dynamic learning environment that will enhance officer preparedness in this crucial area.

Statements and Declarations

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Marcelo Castro, Ph.D., Committee Chair, Grace A. Telesco, Ph.D., Committee Member, Kimberly Durham, PsyD, Dean

In the dissertation documents will see a letter form the Puerto Rico Police Commissioner Antonio López – Figueroa, giving the approval to do the research with police officers in Puerto Rico, and also participants documents of consent

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Imitative Dissonance in J. S. Bach's Stretto Fugues

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Abstract

Dissonance treatment is an important part of creating tension and resolution in music, but most studies relating dissonance to a work's dramatic structure are almost exclusively focused on pitch (Maus, 1988, Sobaskie 2006, and Richards 2011). In stretto fugues, the overlapping statements create metrical displacement dissonances because of the conflicting metrical cues in different parts. This paper defines a way to measure such imitative dissonance and analyzes how the relative tension of different passages in stretto fugues by J. S. Bach contributes to their dramatic arcs. Scholars analyzing Bach's fugues (Mann, 1958, Bruhn 1993, Ledbetter 2002, Kerman 2005, Rings 2011, and McDonald 2019) have examined stretto passages, but only McDonald has examined how strettos relate to a work's dramatic arc, and she does not distinguish between stretto fugues and other kinds. This paper will present analyses of the stretto fugues from Bach's Well-Tempered Clavier, showing that the progression of the imitative dissonance in each one helps to shape its dramatic arc.

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Introduction

Dissonance treatment is an important part of creating tension and resolution in music, but most studies relating dissonance to a work's dramatic structure are almost exclusively focused on pitch (Maus, 1988, Sobaskie 2006, and Richards 2011). In stretto passages, the overlapping subject statements create metrical displacement dissonances because of the conflicting metrical cues in different parts (Mirka, 2009, 189–198). This paper defines a way to measure the resulting tension and analyzes how the relative tension of stretto passages in fugues from *The Well-Tempered Clavier* contributes to their dramatic arcs. Scholars analyzing Bach's fugues (Mann, 1958, Bruhn 1993, Ledbetter 2002, Kerman 2005, Rings 2011, and McDonald 2019) have all examined stretto passages, but only McDonald has examined how the relative tension of different strettos relates to a work's dramatic arc. This study differs from McDonald's in that it focuses exclusively on the stretto fugues of *The Well-Tempered Clavier*, defining "stretto fugues" as those that employ stretto throughout with no developmental episodes between stretto passages. If one restricts the definition of stretto fugues to those with no developmental episodes, then there are only four in *The Well-Tempered Clavier*: the C major, D# minor, and A minor fugues in Book I, and the E major fugue in Book II.

Method

The note counts in Ex. 1 represent the relative dissonance created by the imitation in each stretto passage. I define imitative dissonance here as the displacement dissonances created by overlapping imitative entries. For any given stretto passage, the amount of imitative dissonance can be calculated by counting the number of notes in each subject entry that sound against another voice either articulating or sustaining a different note from the same subject. This measurement counts a given stretto passage as over when there are no longer multiple voices articulating different notes from the same subject. The listed values match our intuitions regarding how these passages shape the drama of the fugue: there is a gradual increase in tension leading to a climax roughly two-thirds of the way through, after which there is a de-escalation of tension in the remaining stretto passages.

Those not actively researching metrical dissonance or the analysis of music with imitative textures might not immediately recognize any metrical dissonance in these stretto passages at all. The key to understanding the metrical dissonance inherent in most stretto passages is the concept of parallelism, cited as a metrical preference rule in Longuet-Higgins and Steedman (1971), Steedman (1977), and Lerdahl and Jackendoff (1983), and explored further as such in Temperley (2001), Temperley and Bartlette (2002), and Mirka (2009). The essential concept is this: whenever a particular pattern of note durations and intervals return together, a listener will naturally interpret the latter iteration of the pattern as having the same metrical pattern of accentuation that it had in its first occurrence. In the case of stretto fugues, a parallel metrical reading will almost always lead to what sound like metrical displacement dissonances when later subject entries begin in a different metrical position than the opening statement did. In Example 1, for instance, the first three eighth notes lead to a longer note on beat 3 in the initial presentation of the subject, but in m. 7, the first three eighth notes of this same material starting on G in the left hand lead to a longer note on beat 4. Because the first three notes in m. 1 led to a fourth note on a strong beat initially, the listener will hear a metrical accent on beat 4 of m. 7 despite the fact that the note no longer falls

in a metrical strong place relative to the notated and sounding meter. This conflict is all the more powerful in this particular instead of stretto because the right hand in m. 7 is simultaneously presenting the subject in its original metrical position and with the same pitch classes, only realized an octave higher.

Results

C-Major Fugue, BWV 846



Figure 1. Bach's C-Major Fugue, BWV 846.

The dramatic structure of stretto fugues depends in part upon the density of each stretto passage (i.e., how many overlapping entries are present, and the extent to which they overlap). Consider Figure 1 and 2, which provides a score of Bach's C-Major Fugue, BWV 846 and annotates the number of notes conflicting in each stretto. The note

counts for each conflict are calculated by adding together each note in a voice presenting the subject that sounds against a non-corresponding note from the same subject. To better understand this measurement, examine m. 7 in Figure 1 and 2, where the first stretto passage of the fugue begins. The subject itself is 14 notes, but the first two notes of its presentation in the right-hand part of m. 7 do not sound against the subject in any other part. On its third note, however, the subject statement is joined by an answer statement in the left-hand part, and so the remaining 12 notes of the subject statement in the right-hand part all sound against non-corresponding notes in the left-hand part's answer and are thus counted as conflicting. Likewise, the first 11 notes of the answer statement also sound against non-corresponding notes and are counted as conflicting. Only the last 3 notes of the answer are not in conflict with the right hand's statement, because the right hand's subject statement doesn't end until halfway through beat 3 in m. 8. 12 conflicting notes in the right-hand statement added to the 11 conflicting notes in the left-hand statements yields a total number of 23 conflicting notes for this stretto. All the remaining note counts in Figure 1 and 2 are calculated in a similar fashion.



Figure 2. Bach's C-Major Fugue, BWV 846 continued

Table 1. Analysis of C-Major Fugue Stretto Passages

BWV	# of conflicting notes in successive stretto passages	highest-rated stretto location (mm.)	total # of measures	location's relative position
846 (C major)	23, 28, **94**, 26, 14, 20	14-19	27	52-70%

The note counts in Figure 1 tell a familiar story of a gradual rise in tension to a climax roughly two-thirds of the way through, followed by a de-escalation of tension. After the fugal exposition in mm. 1-6, the tension increases in mm. 7-8 when entries are presented a quarter note apart, and increases further in mm. 10-13 when entries on G and D are presented a quarter note apart, and then joined by an entry on E as the entry on D presents its last three notes. In mm. 14-19, the rise of tension eclipses anything heard prior. The third stretto begins deceptively, with

entries on C and G a quarter note apart like the first stretto, but it stretches six measures and includes eight entries, four times as many as the first stretto, and three times as long. This third stretto is the climax of the work, and while the diminished and augmented harmonies in the first half of m. 18 play a role, it is the imitative dissonance as much as the pitch dissonance that marks it as special.

The note counts in Figure 1-2 represent the relative dissonance created by the imitation in each stretto passage. I define imitative dissonance here as the displacement dissonances created by overlapping imitative entries. For any given stretto passage, the amount of imitative dissonance can be calculated by counting the number of notes in each subject entry that sound against another voice either articulating or sustaining a different note from the same subject. This measurement counts a given stretto passage as over when there are no longer multiple voices articulating different notes from the same subject. The listed values match our intuitions regarding how these passages shape the drama of the fugue: there is a gradual increase in tension leading to a climax roughly two thirds of the way through, after which there is a de-escalation of tension in the remaining stretto passages.

Those not actively researching metrical dissonance or the analysis of music with imitative textures might not immediately recognize any metrical dissonance in these stretto passages at all. The key to understanding the metrical dissonance inherent in most stretto passages is the concept of parallelism, cited as a metrical preference rule in Longuet-Higgins and Steedman (1971), Steedman (1977), and Lerdahl and Jackendoff (1983), and explored further as such in Temperley (2001), Temperley and Bartlette (2002), and Mirka (2009). The essential concept is this: whenever a particular pattern of note durations and intervals return together, a listener will naturally interpret the latter iteration of the pattern as having the same metrical pattern of accentuation that it had in its first occurrence. In the case of stretto fugues, a parallel metrical reading will almost always lead to what sound like metrical displacement dissonances when later subject entries begin in a different metrical position than the opening statement did. In Figure 1, for instance, the first three eighth notes lead to a longer note on beat 3 in the initial presentation of the subject, but in m. 7, the first three eighth notes of this same material starting on G in the left hand lead to a longer note on beat 4. Because the first three notes in m. 1 led to a fourth note on a strong beat initially, the listener will hear a metrical accent on beat 4 of m. 7 despite the fact that the note no longer falls in a metrical strong place relative to the notated and sounding meter. This conflict is all the more powerful in this particular instead of stretto because the right hand in m. 7 is simultaneously presenting the subject in its original metrical position and with the same pitch classes, only realized an octave higher.

A similar plan to the fugue in Figure 1-2 can be found in the other stretto fugues from Book I of the Well-Tempered Clavier. The D#-minor fugue's exposition is given as Example 2, while Example 3 gives its stretto passage with the most imitative dissonance. Unlike the C major fugue, the D#-minor fugue presents its longest stretto passage closer to the end, a complex weave that stretches from m. 61 to m. 75 and includes 75 notes in metrical conflict, though the last of these conflicts appears in m. 72 when the ending of one subject in the alto voice is elided to the beginning of the next subject entry in that same voice (the first is in augmentation, while the second is not). The fugue is 87 measures and so this stretto passage begins 70% of the way into the fugue and ends 86% of the way through it. The C-major fugue, on the other hand, is 27 measures and its climactic stretto passage begins 52% of

the way into the fugue and ends 70% of the way through it. In the C-major fugue, the climactic stretto passage straddles the Golden Mean, while in the D# minor it begins after that point, but still well before the ending.

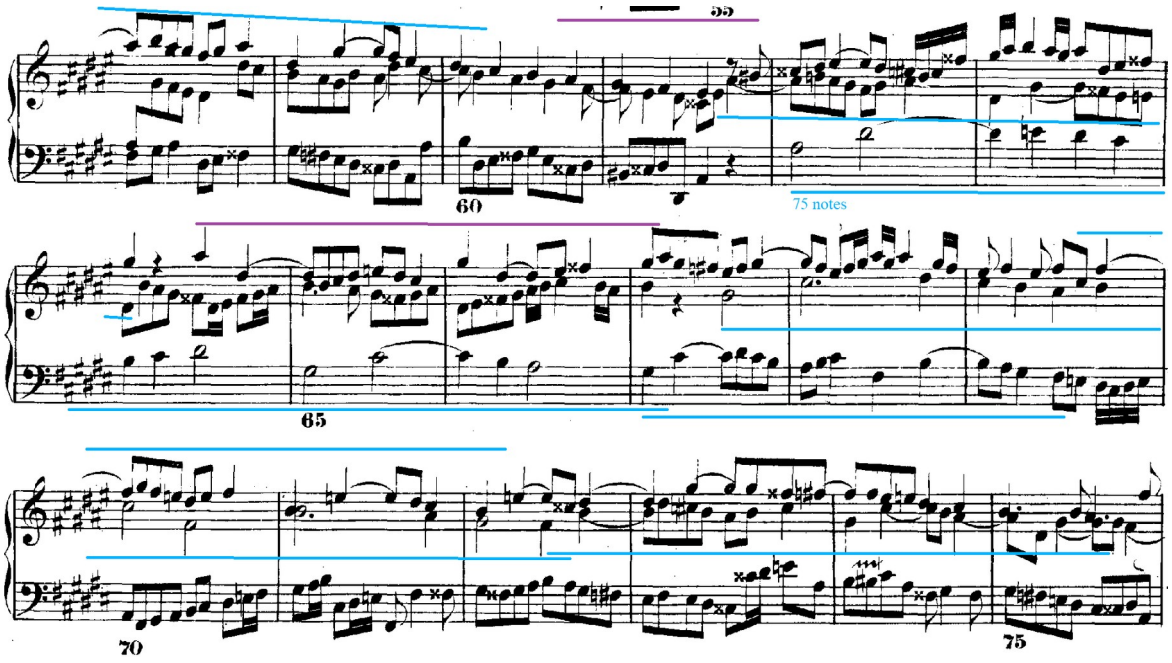
D#-Minor Fugue, BWV 853

A similar plan to the fugue in Figure 1 can be found in the other stretto fugues from Book I of the *Well-Tempered Clavier.* The D#-minor fugue's exposition is given as Example 2, while Example 3 gives its stretto passage with the most imitative dissonance. Unlike the C major fugue, the D#-minor fugue presents its longest stretto passage closer to the end, a complex weave that stretches from m. 61 to m. 75 and includes 75 notes in metrical conflict, though the last of these conflicts appears in m. 72 when the ending of one subject in the alto voice is elided to the beginning of the next subject entry in that same voice (the first is in augmentation, while the second is not). The fugue is 87 measures and so this stretto passage begins 70% of the way into the fugue and ends 86% of the way through it. The C-major fugue, on the other hand, is 27 measures and its climactic stretto passage begins 52% of the way into the fugue and ends 70% of the way through it. In the C-major fugue, the climactic stretto passage straddles the Golden Mean, while in the D# minor it begins after that point, but still well before the ending.



Figure 3. Bach's D#-Minor Fugue, BWV 853, Exposition

The opening of the A-minor fugue from Book I of the *Well-Tempered Clavier* is given as Example 4, while Example 5 gives its stretto passage with the most imitative dissonance. Like both of the previous fugues discussed, the A-minor fugue features its longest stretto passage well after the halfway point. The stretto passage begins in m. 64 with the subject in the bass, and its first conflict begins in the next measure when the tenor voice enters with the subject two beats later. Before the tenor voice is finished with its statement the soprano voice introduces the inverted subject in m. 67 followed two beats later by the alto presenting the inverted subject a fifth lower. The stretto passage ends when the alto voice presents the last note of the subject in m. 71. Because the subject itself has so many notes, there are 118 conflicts in this passage. The passage begins 74% of the way through the fugue and ends 82% of the way through it, again coming after the Golden Mean, but still well before its ending.



Note: blue line = subject entry; purple line = inverted subject entry

Figure 4. Example 3. Bach's D#-Minor Fugue, BWV 853, mm. 61-75 (stretto with 75 conflicting notes)

Table 2. Analysis of D#-Minor Fugue Stretto Passages

BWV	# of conflicting notes in successive stretto passages	highest-rated stretto location (mm.)	total # of measures	location's relative position
846 (C major)	23, 28, **94**, 26, 14, 20	14-19	27	52-70%
853 (D# minor)	23, 22, 24, 22, 22, **75**	61-75	87	70-86%

While a compositional strategy regarding the placement of the most intense strettos within a stretto fugue might appear to emerge when considering those from Book I of the Well-Tempered Clavier, an analysis of the E major fugue from Book II of that collection clouds the issue. Example 6 provides an annotated copy of the E-major fugue from Book II. In this fugue, the stretto passage with the most metrical conflicts appears early on in the fugue in mm. 12-15. It does not, however, carry the same tension as the imitative dissonances heard in later strettos because it is not a stretto based directly on the opening fugal subject, but rather, its countersubject. In order for the listener to perceive the metrical conflict central to imitative dissonance, they must first have some sense of its original metrical context. That is, the fugal exposition establishes where each note of the subject falls in the established meter and the tension is the result of the listener's tendency to interpret later subjects in a parallel way with regard to the meter, even though stretto all but guarantees that this will not be the case. None of the stretto fugues discussed so far have a stretto based on any material other than the subject. Though one could argue that the countersubject's metrical context is established in the exposition of the fugue as well, performance practice dictates that the countersubject will be played at a softer dynamic because it is considered an accompanying voice to the subject each time it appears with the subject or answer, which is the only way it appears in the exposition. In addition, the metrical placement of the entries in the stretto passage from mm. 12-15 match those found in the exposition, so there isn't much of a perceived conflict. That is, the countersubject entries in the exposition start on beat 1 of m. 3 (first pitch: E3), beat 2 of m. 4 (first pitch: A3), and beat 1 of m. 6 (first pitch: E4), and the

entries in mm. 12-15 start on beat 2 of m. 12 (first pitch: E#4), beat 1 of m. 13 (first pitch: B3), and beat 2 of m. 13 (first pitch: F#2).

Even if one argues that the metrical conflict of the stretto in mm. 12-15 is heard differently because of its weaker relationship to the opening material, locating the stretto heard as most dissonant is still difficult because there is a tie between the next two stretto passages with the most imitative dissonance: the stretto passage in mm. 9-12 and the one in mm. 25-28 both have 23 notes in metrical conflict with a subject statement in another voice. Here, one might argue that the second of these passages is actually heard as being longer and having more conflicts because there is a stretto passage that immediately follows it in mm. 28-29 and it employs the same version of the subject just presented in mm. 26-27 in the soprano and alto voices.

The comparative chart of the four fugues analyzed in this presentation is given at the bottom of Ex. 6. While the sample size is admittedly small, one can see a pattern emerge regarding the placement of the stretto passages containing the most imitative dissonances, at least when measured by the number of conflicting notes. In each fugue, the passage with the highest imitative dissonance comes somewhere between 52% and 86% of the way through the fugue, matching our intuition that, because a good dramatic arc often has a climax roughly two-thirds of the way through, a well-written fugue might reach a moment of greatest tension at the same point in its journey. Imitative dissonance as measured by the number of metrically conflicting notes is certainly not the only kind of dissonance that might shape a climax in a stretto fugue, it’s just one that has thus far been neglected in our discussions of dissonance. It should come as no surprise that pitch dissonance also plays a significant role in marking what sounds like the climax in each of these fugues. The purpose of this paper has been to explore the role of imitative dissonance in the structure of stretto fugues, but future research might examine its role in other genres that feature imitation.

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Tapping Into Community Expertise Through Collaborative Advocacy

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Abstract

In today's contentious social climate, nonprofit organizations (NPOs) face severe conservative political backlash for advancing equity-minded goals. Since Donald J. Trump's second presidency, many NPOs have experienced drastic government funding cuts for diversity, equity, and inclusion (DEI) initiatives. Significant reductions have impacted organizations combating hate crimes, supporting missing persons, and conducting scientific research or disability services. Notably, as the Council on Criminal Justice (2025) reported, federal cuts severely affected NPOs focused on community safety, violence intervention, and LGBTQ+ populations. Consequently, this financial strangulation forces NPOs to rely heavily on private philanthropic donors and grassroots community contributions to sustain their vital services. Against this backdrop, this paper presents an autoethnographic perspective on the author's journey in LGBTQ+ community advocacy. It explores the foundational challenges and ongoing maintenance of nonprofit work in a hostile funding environment. Furthermore, the article provides introspection on how academic scholars can leverage their expertise to champion social advocacy initiatives in their communities while simultaneously advancing their institutional standing through the Retention, Promotion, and Tenure (RPT) process. Finally, the paper discusses broader implications for future research bridging academic scholarship and community-based nonprofit advocacy.

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Introduction

Pre-Advocacy Work

When I was hired as a high school teacher in 2002, the new school had only been open for a year and was still growing. I happened to be the only queer teacher on campus. Even though I did not come out during my interview, my long hair and earrings might have given me away. My principal, who was a conservative white man, shocked me by alluding to wanting to establish an inclusive school community that accepted all people. He said, “I don’t mind the long hair or earrings, and I don’t care what people do behind closed doors.” Homosexuality was not fully decriminalized nationwide yet, with *Lawrence vs. Texas* taking place a year later (Franke, 2004), so the stigma that a queer schoolteacher is a pervert or pedophile was still lingering in the minds of many at the time.

During my 16 years as a high school teacher, I never came out to my students or felt comfortable sharing pictures of my partner and me. I wasn’t ready to be the poster child for queer people at my place of work. It was more important for me to let my teaching and work ethic speak for themselves. However, I did not shy away from correcting students when I heard them using homophobic or any other discriminatory slurs among their friends. I wanted all of my students, whoever they were and however they identified, to know that such defamatory language was not acceptable, ever. Moments like these throughout the years led me to teach my high school students, many of whom came from Hispanic, low socioeconomic backgrounds, to advocate for themselves at school, where the majority of faculty were white, middle-class people who did not experience the hardships of living in the impoverished areas of our town and could not relate to them.

Students would often come to me seeking advice on navigating hard conversations with their other teachers and family members, or on coming to terms with their own feelings. For some students, the conflict they experienced was with themselves and the internalized homophobia that manifested in their beliefs about themselves and how it negatively affected their relationships as they struggled to accept their LGBTQ+ identities (Frost & Meyer, 2009). Even during these instances, I did not disclose my own queer status for fear of professional backlash against my credibility as an educator. What I really wanted to say to those kids was, “I know what it’s like being in your shoes. I was once that queer kid, and I know what it’s like to be rejected and misunderstood by the adults in your life.” But I didn’t say those things. So, I sat with them, empathized, and tried to help them work it out with encouragement like, “It’s going to be okay. You are going to be okay.” In many cases, these students sought me out as someone who would listen to them, validate them, and know that they were safe to be their authentic selves with me. Yet, deep down, I felt like a coward, and that cowardice stuck with me until I began working as a teacher educator.

The Start of LGBTQ+ Advocacy

In 2018, I started a new teaching position at a public university that was a six-hour drive from where I lived in Southern California. Like many new professors in higher education trying to break into academia, I had to go where the job was, which meant disrupting my partner and me by uprooting us to move closer to my new position. Moving is always a difficult transition, but when you don’t know the area you are moving to, it is even more

challenging. I had already been a high school teacher for 16 years and was well established and vested in my job. I loved teaching my high school students, yet there was a pull toward higher education, a desire to make a greater impact in the lives of the students I served. So, when I saw an opening for an Assistant Professor position in the Department of Teacher Education at my current institution, I applied without hesitation.

There were significant adjustments I needed to make when transitioning from teaching public high school students from predominantly low-income households to post-baccalaureate pre-service teachers serving both urban and rural areas. This job change included working with adult learners as opposed to adolescents, the frequency with which I saw my students, with most classes conducted as weekly seminars, and the increase in administrative duties as a professor with departmental, committee, and consortium meetings, all of which were not a prevalent part of my job duties as a high school teacher. One of the most daunting aspects of the job for me as a new professor was the Retention, Promotion, and Tenure (RPT) process. I was not aware of the stringent criteria and rigorous evaluation process to which I agreed when I accepted my position.

The RPT process was not well-explained to me when I was newly hired. My Department Chair at the time tried to explain that each year for the next five years, I would be evaluated by a panel of my peers of higher rank than me to determine if I should retain my employment or not based on three main categories that university faculty are held to, including the quality of teaching, scholarship, and service I complete each year. I was handed the departmental criterion, or "elaborations," as they are referred to, and sent off with a "Good luck!" No guidance and no exemplars provided.

In the coming months of my first year, I soon became aware that each department had its own elaborations with varying criteria for retention, promotion, and tenure. I also learned from speaking with newly hired faculty in other departments about the tumultuous and contentious history of faculty in my own department, who were initially denied tenure because of a hazing mentality that existed before my arrival. Needless to say, I was slightly terrified about meeting my department's expectations and getting all of this done in time for my first evaluation. A part of me thought, "Can I really do this? Where do I begin?" Luckily, I had a kind colleague who, only two years into the job, sensed my looming dread and helped clarify the process by providing recommendations on how to collect the data I needed to successfully demonstrate my competence across all areas of my RPT narrative.

I was never keen on boasting about myself or my accomplishments, which is somewhat required by the RPT process. At my institution, many people evaluate RPT files, including my department colleagues of higher rank, the Dean of the College, the University RPT Committee, comprising senior-ranking faculty members from different colleges across the university, and the Provost. Still, my department colleagues play a significant role in determining my fate, which influences evaluators outside the department.

My heart raced as I entered my first meeting with my RPT department committee to discuss my RPT working action profile and their recommendation for retaining me in my position. The panel comprised three senior faculty members, none of whom represented the program I taught in. Even though our meeting was on Zoom, I felt intimidated by my colleagues. I began to feel warm, and little beads of sweat started to collect on my brow. All I

could do was hope they did not notice my nervousness as I nonchalantly tried to mask my apprehension with a smile as I was let into the Zoom room. They welcomed me with a lively “Good morning” to put me at ease in the virtual room. I took a deep breath in and exhaled before unmuting myself and addressing my colleagues with a somewhat forced “Morning to you. I look forward to hearing your feedback.”

The 30-minute meeting went better than I expected, with two of the three committee members providing me constructive feedback on my progress. One member didn't say a word to me, and honestly, I don’t think he even reviewed my files, leaving the other two to lead the conversation. While some of the committee’s feedback was technical and stylistic, one recommendation stood out to me. They suggested that I seek service opportunities that I can cohesively connect to my teaching and scholarship. They said a narrative that interconnects all three areas of evaluation—teaching, scholarship, and service—demonstrates a strong sense of purpose and academic alignment, the golden trifecta of RPT narratives. But how do I do that? How can I, as a new university professor, demonstrate community service that benefits my academic profile for the retention, promotion, and tenure process while serving my community at large? The challenge for me was understanding the RPT process and finding ways to interact with my community that are impactful and also count toward meaningful service, as defined by my department’s RPT elaborations. Like many academics before me, new university faculty who are required to serve as part of their RPT often say “yes” to serving on committees and attending meetings, hoping that the service work is compelling and genuinely aligns with their interests and expertise.

The following year, I attended a conference hosted by the Social Work Department at my university, highlighting the myriad challenges that transgender individuals face in the Central Valley, including gender and sexual discrimination, access to quality healthcare, employment disparities, and food insecurity (Baugher, A. et al., 2024; Goldsen et al., 2022). I was instantly interested in somehow getting involved with the LGBTQ+ community in the Central Valley, CA, where my university is located, but I was not sure how to do so. I met a trans man with a nursing background at the conference who was working to start a chapter of a national nonprofit organization that champions LGBTQ+ youth in K-12 schools across the country. He proposed that we work with a select group of queer-identifying individuals in Merced County to support LGBTQ+ youth in the Central Valley of California. This seemed like the positive incentive I needed to do meaningful community service and advocacy for queer youth in K-12 schools.

Several months passed, and our chapter was established, with the majority of the board comprising educators from K-12 schools or higher education. As a teacher educator, I quickly developed training modules to provide professional development for local school districts, faculty, and staff on supporting LGBTQ+ youth in K-12 schools, which aligned with California law (Legiscan, 2019; Equality for California, 2019). And the training I conducted was well received by public schools across California, spanning beyond the Central Valley.

A year had passed since my first RPT evaluation, and another departmental committee reviewed my RPT file, finding greater congruence between my teaching and service narratives. I was actively serving local school districts in the Central Valley and across California that had heard of the professional development our nonprofit chapter provided. The rise in training on LGBTQ+ awareness and support for this student population in K-12

schools helped me make significant strides in developing more robust curricular changes to a course focusing on equity and diversity, offered in the teacher preparation program I teach in at my university. Before I overhauled the curriculum for that course, LGBTQ+ issues were never addressed with our teacher candidates. Luckily, the colleagues in my department were very supportive of my integration of LGBTQ+ awareness into our teacher preparation programming since they recognized the importance of understanding how informed educators can help suppress bullying and harassment of LGBTQ+ youth and how queer issues in education are often not part of academic discourse for pre-service K-12 teachers (Clark & Kosciw, 2022; Jennings, 2010).

Advocacy During the Pandemic and After

The COVID-19 pandemic in early 2020 brought our nonprofit work in schools to a halt. With all academic institutions conducting business and school via online platforms, the priorities many educators had about supporting queer youth changed dramatically, fizzling out as many K-12 teachers and administrators struggled to meet the technology needs and address the devastating learning gaps caused by the lack of in-person accountability measures, with the highest achievement gaps in areas like the Central Valley where a majority of students are Hispanic and of low socioeconomic status (Crow, 2022; Pier et al., 2021).

The shift to online-only interaction forced our chapter to reassess its priorities and how to proceed with its advocacy efforts. This caused friction between the board members and the originator of our chapter, who sought to profit financially from our work, leading him to leave me to lead the chapter alone. Furthermore, being supported by a national organization undergoing significant administrative changes during the COVID-19 pandemic left us bound to policies that did not align with the community service work our local communities needed. Our chapter later separated from our national sponsor to join forces with another local group engaged in community service for the LGBTQ+ community, which was more aligned with the vision of service we sought to impact. As a result of this merger, the nonprofit organization Central Valley Pride (CVP) was formed.

Today, we have expanded our capacity to serve our community with more volunteers engaged in direct on-campus student services for queer youth in local high schools, increased our presence in the larger community with integrative events (i.e., the Merced Queer Film Festival and Pride celebrations), and added more socials and peer support groups that center participant lived experiences. However, getting to this stage of our development as a nonprofit organization (NPO) has not been financially easy.

The Problem

The Impact on LGBTQ+ people

For NPOs conducting work and providing assistance that serve LGBTQ+ communities, the reduction of federal and state funding is also coupled with the explicit attack on queer people, including LGBTQ+ youth. The growing number of anti-LGBTQ+ legislation introduced in 2025 is staggering. According to the American Civil Liberties Union (2025), there are over 600 bills targeting queer people nationwide. Within the queer community, transgender (or *trans* for short) and non-binary individuals experience even greater discrimination and hate, with

an astounding 1000+ pieces of proposed legislation targeting this subgroup. According to the Trans Legislation Tracker (2025), 124 anti-trans bills have been passed nationwide in the US, with 506 still active and 382 having failed, while 277 of them target LGBTQ+ youth in educational settings aimed at denying equitable access to restrooms that align with their gender identity. Other proposed bills attempt to deny trans and non-binary students the right to use their affirmed pronouns and names that may differ from their sex assigned at birth or given name at birth.

The undue stress caused by discriminatory political policy imposed on young people has significantly impacted LGBTQ+ mental health. Research conducted by the Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services has raised red flags on the declining mental state of queer youth concerning self-harm and suicidality (Verlenden et al., 2024). Additionally, the 2024 U.S. National Survey on the Mental Health of LGBTQ+ Young People, conducted by the Trevor Project, states 39% of over 18,000 queer youth between the ages of 13 and 24 seriously considered suicide, and 1 in 10 youth attempted suicide in the last year (Nath et al., 2024).

The Impacts on NPOs

The staggering statistics paint a picture of a harsh reality for LGBTQ+ youth today, which is why it is so important for nonprofit organizations that support this marginalized population to continue and thrive. Yet, the current political climate has negatively impacted NPOs by reducing or eliminating funding sources that they desperately count on for financial sustainability (McNeill, 2025). While funding sources for nonprofit work are rarely consistent and reliable, some nonprofit organizations are impacted even more due to the communities they serve or the messaging they promote, such as queer-affirming organizations or those promoting diversity, equity, and inclusion (DEI) initiatives that challenge normative perceptions of being (i.e., binary, cisgender, or heterosexual). Additionally, the inequity of funding for local NPOs servicing the needs of LGBTQ+ communities often leads to increased disparities in other areas, such as housing and employment for queer youth later in life (Surfus, 2013).

There are numerous reasons why nonprofit organizations often fail to stand the test of time. One ongoing challenge NPOs face is inconsistent funding sources. According to an online article by *The Conversation*, “less than US$1 out of every $500 donated in 2021 – the most recent year for which data is available – went to support LGBTQ+ organizations” (Ackerman & Bergdoll, 2024). Also, most funding comes with expectations that nonprofits must meet to receive it, leaving little wiggle room for how nonprofits allocate such monies. More often, NPOs receive funds for time-bound, conditional projects. The lack of unrestricted funding can place undue pressure on nonprofits by overextending the hours volunteers donate to funded projects and leaving little flexibility for overhead costs (Shaker & Wiepking, 2021).

Another challenge for starting and developing NPOs is their lack of digital presence in a growing cyberworld. It can be difficult for new NPOs to navigate the demand for digital presence in a tech-driven society where donors and constituents may expect easy access to the nonprofit’s information and services. Digital and social media that accurately depict the impact of the NPO’s work in the community are key to greater visibility and accessibility.

Technology is ever-changing with the times and with those who manipulate it. This requires NPOs to advertise their services across multiple social media platforms, depending on their target audience, and to use compelling stories that connect with supporters' pathos. With high digital visibility and regular, consistent content, NPO supporters become more aware of upcoming events and emotionally invested in the service work they support (Phillips, 2022).

For evolving nonprofit organizations, consistent, reliable support for their work is an ongoing struggle. Most small NPOs do not have the financial capacity to pay volunteers decent wages that allow them to live on as they do in for-profit work, and the NPO's vision steers people's ongoing support (Leete, 2006). For volunteers and advocates of NPOs, their passion for community service drives their engagement more than monetary incentives (Nelson, 2018).

Changes in leadership in NPO development can also affect an organization's success. Oftentimes, growing NPOs have a select few on whom the majority relies. When difficult life circumstances affect those leaders, forcing them to step down without others to assume the leadership responsibilities, developing groups can lose traction, fizzle out, and dissolve.

Methods and Research Questions

This research study is informed by personal and professional experiences as a current university professor and by my integral service work in the nonprofit sector. I employ an autoethnographic approach to document my past and current participation in the development of a queer-centered nonprofit organization, how community advocacy has evolved for me, and how it has impacted my academic trajectory through the RPT process. Autoethnography serves as a valid methodology for this study by affording me, the author, the flexibility to recount personalized accounts grounded in deep self-reflection or reflexivity (Polous, 2021). I used journaling and note-taking to document critical conversations with departmental colleagues at my university and with members of the NPO I work with. This work is supported by current research in nonprofit work and influenced by queer theory (Dicke & Ott, 2023; Meyer et al., 2022).

The span of time in this study covers over two decades, with a focus on the last eight years (2018 - 2026), including the connections between community service work and the impacts on the RPT process. This research will address two main questions: How can academics help nonprofit organizations focused on LGBTQ+ advocacy sustain themselves in times of political uncertainty? How can I, as a new university professor, demonstrate community service that benefits my academic profile for the retention, promotion, and tenure (RPT) process while serving my community at large?

Working as an Academic in the Nonprofit World

Demographics of the Central Valley, CA

To better understand the importance of Central Valley Pride's work, it is crucial to understand the demographic

region our nonprofit organization serves. The Central Valley comprises 450 miles of vast land, much of it dedicated to agriculture, that stretches from north to south in the middle of California. With 18 counties and a population of over 1.8 million, the Central Valley is rich in agricultural crops, yet its rurality and economic disparities make it one of the most impoverished regions in California (USGS, 2026).

Central Valley Pride (CVP) is based in Merced County and centers most of its work in this service area. Merced County has grown significantly, with a current population of over 299,000 people that has tripled within the last 60 years. Merced County has a minority-majority ethnic background, with a predominant Hispanic population of 63% (Pedrozo, 2025).

The demographics of the geographical area CVP serves are significant when considering the most recent statistics of queer identification. According to the most recent 2024 Gallup poll, 9.3% of all American adults identify as LGBTQ+. The percentage of queer-identifying individuals has increased with each generation, with more Gen Z people emboldened and comfortable not identifying as cisgender and/or heterosexual, also known as *cishet* (CNN, 2025; Gallup News, 2025). This percentage can vary by region, but in California, it is higher, particularly among youth, with 11% of all adolescents in California between 13 and 17 years of age identifying as LGBTQ+ (Children Now, 2023). The Central Valley remains a conservative region with high rates of poverty and food insecurity among people of color despite its rich agricultural resources.

Centering Queer People with Queer Advocates

Central Valley Pride is a unique nonprofit organization that comprises and centers queer people serving queer people in a conservative area where LGBTQ+ representation and visibility are lacking. It is essential to have queer representation within the nonprofit organization serving its own community in transformative ways. In their queer analysis of academic literature, Meyer et al. (2022) find that academic “research did not always show LGBTQ people as being active participants in their experiences and struggles and instead are being acted upon” (pp. 574). The lack of queer agency in academic literature and nonprofit spaces legitimizes the need for authentic queer representation.

Queer volunteers in nonprofit work model civic duty that promotes the betterment of their own community. This empowers queer recipients of nonprofit services to build deeper connections within the LGBTQ+ community, ultimately leading to future transfers of services to their broader community. Support through nonprofit work by queer people for queer people is an identity-based motivation that may initiate volunteerism but may not sustain it when other factors take precedence (i.e., financial and time constraints that impede participation in the service work). A shared identity among volunteers and those they serve may also help mitigate burnout (Molina et al., 2017).

Developing Collaborative Advocacy Through Nonprofit Work

Over the last three years working with CVP as a nonprofit organization, we have learned key lessons that have

helped us become a cohesive, thriving organization, even as others doing similar work have failed. Having a core group of people with similar goals and a shared mission is vital. Together, we created CVP's three-pronged mission: We engage people through community activities and events that express a sense of pride in LGBTQ+ identities. We create a positive impact by providing high-quality, research-based professional development for educators in K-20 schools, including developing safe spaces and creating a Culture of CARE for LGBTQ+ individuals (McFarland, 2025). This professional development training for all educational stakeholders helps improve pedagogical practices with LGBTQ+ youth, using both in-person and online platforms to accommodate the needs of the school district or institution. We also empower LGBTQ+ young people through peer advocacy, peer support groups, and mental health services by establishing in-person and online interconnection and community for anyone interested in our initiatives.

Jennifer, one of our co-founders of Central Valley Pride, has consistently instilled the mantra "Be vocal. Be visible. Have a presence" among all members of the organization, underscoring the power of queer community-centered advocacy. Such work requires individuals to be brave enough to call out the injustices that frequently plague the LGBTQ+ community with bullying, discrimination, and harassment. Speaking up for marginalized people is not the same as speaking over them. As with community-centered queer advocacy, our presence has become an important element of the work we do. For example, through our direct student services, adult facilitators work with queer youth and their allies in teacher-advisor classrooms and other designated spaces on high school campuses, offering a myriad of activities, including relationship-building, arts and crafts, and leadership development. These types of interactions afford opportunities for intentional mentorship, where adolescents are free to witness positive queer role models and for facilitators to assist students in navigating life as queer youth in areas where they are not fully accepted as their authentic selves.

When developing collaborative advocacy and member capacity, it is crucial to tap into NPO members' competencies and abilities. For example, small-group facilitation for queer youth requires a skill set that is not suited to just anyone, underscoring the need for CVP to tap into the expertise and experience of our selected facilitators. Our adult facilitators go through extensive onboarding and training to prepare them to work with high school youth, and they are young enough to relate to the youth they serve and mentor. Our facilitators are also members of the same community they serve and have shared experiences as queer individuals with past struggles similar to those the adolescents are looking to overcome presently. The time commitment can also be a determining factor for some of the CVP team, since the Student Pride Alliance group meetings at the local high schools are typically held during lunch hour in the middle of the workday, when many individuals have conflicting job responsibilities. I have often wanted to attend these on-campus meetings and activities with our CVP facilitators to experience this level of service and advocacy that directly impacts queer youth, yet time constraints have impeded me from joining.

Building Capacity

Members of NPOs are passionate people and go into doing nonprofit work for personal reasons. To build capacity within our organization, we have intentionally recognized the multiple strengths that members bring to community

service and advocacy. For instance, one co-founder has extensive work experience as a social worker and with behavioral health, which has helped guide our facilitator training and peer support groups. Another member had worked in the healthcare field and had developed module training for sexually transmitted infection (STI) prevention for LGBTQ+ people. Uplifting our group members by providing opportunities to highlight their strengths and expertise in queer advocacy became a major message of inclusion, underscoring that every member had an important part to play in the organization. When NPO leadership trusts their members by leveraging their strengths, nonprofit volunteers gain honor for their contributions to their communities. This also instills in NPO members a sense of worth and usefulness, as acknowledged by extending leadership opportunities to create greater impact.

Doing queer advocacy in a high-need service area has proven to us as an NPO that sometimes the need for services extends beyond what we are capable of providing, such as foster care or extensive mental health services for queer youth who have been abandoned by family and were contemplating suicide. In cases like these, Central Valley Pride leans on other social service advocates in our communities for assistance and guidance. This has allowed us to partner with other organizations and advocates by sharing them as resources, ensuring our community members receive appropriate services without overcommitting our CVP team.

Sustaining Growth

The development and growth of an NPO can take time and proper funding to achieve the organization's goals. With a volatile political climate that threatens LGBTQ+ initiatives, federal and state funding have been greatly reduced for queer advocacy groups like Central Valley Pride. Hence, CVP continues to seek funding from private donors who do not answer to the pressures of conservatism and stifle community service work centered on queer people, yet may not be reliable sources of continual funding (Lynch, 2024). This required us to promote our community advocacy work as individual projects that align with the missions of our donors, therefore concentrating our community services to meet the outcomes required for grant reporting to private donors at the end of the grant cycle, which is typically for one year.

Other key considerations for sustaining capacity with NPOs include maintaining thorough documentation and records of all dealings and ensuring that the organization does not depend solely on the work of one person. CVP has several co-founders who created, developed, and helped morph the NPO into what it is today. As we grew in influence within our community through queer advocacy service that remained visible and vocal with in-person and online presence, CVP has vetted new team members who are equally committed to creating social change for LGBTQ+ people in our county. They have demonstrated buy-in to our organization's mission by consistently showing up for meetings, volunteering for events, and lending their personal and professional skills to advance the cause of improving educational and social experiences for queer individuals. This type of organizational capacity building has a snowball effect, demonstrating lasting reliability to the recipients of our NPO services and promoting future interest in queer collaborative advocacy work when community members are ready to take the next step in giving back to their communities.

The Retention, Promotion, and Tenure (RPT) Process

The retention, promotion, and tenure process can be quite stressful and overwhelming, especially for new university faculty who are unfamiliar with it and may be held to possibly unrealistic expectations of grandeur for advancement (Larson et al., 2020; Zakrajsek, 2021). University faculty who are held to the RPT process have several considerations when making nonprofit community service work an integral part of their professional profile for institutional advancement (Griffith, 2023).

The conditions for my own RPT process are presented in the departmental elaborations, previously approved by my department colleagues and vetted by a larger university-wide RPT committee. The elaborations that guide the conditions of my employment are divided into three distinct categories: teaching, scholarship, and service, with faculty required to produce three descriptive narratives covering each. Drawing on my own experiences with the RPT process, I have found that identifying clear interconnections among all three categories has proven more effective than keeping them separate, as advised by my previous departmental RPT committees (Larson et al., 2019).

My integration of queer issues across all three categories required me to think creatively and reflectively over time. Integrating strategies to best support LGBTQ+ youth in K-20 schools began with in-depth conversations with colleagues in my program and with suggestions for curricular changes that support student learning in culturally relevant pedagogy (Chardin & Novak, 2020; Hammond, 2014). This was the start of blending my personal and professional identities as a queer teacher educator of color. Recognizing the lack of understanding of LGBTQ+ topics in teacher preparation programs influenced my decision to come out publicly in professional settings, which could have negatively impacted my retention status if it were not for the strong support of my department. The move to self-identify as a queer teacher educator strategically positioned me to model visibility of LGBTQ+ educators and speak directly to the needs of queer youth in schools. Recognizing the curricular gap in our programming motivated me to seek out others representing the queer community in the Central Valley, invite proud queer individuals to speak in my classes, and become better informed about the needs of LGBTQ+ people in my service area.

The deep dive into implementing curricular changes sparked my interest in conducting scholarship in queer studies and the issues LGBTQ+ youth face in educational settings. My emergence as a queer scholar was rooted in a personal conviction to educate upcoming secondary teachers to be culturally responsive and aware of the unique needs of queer youth and teachers (McFarland & Kuehn, 2023, & 2025). Establishing professional development training for educators in K-20 schools through community service with Central Valley Pride further informed my emerging scholarly agenda by laying the groundwork for a grounded theoretical framework to create a culture of CARE rooted in compassion, awareness, respect, and empathy (McFarland & Kuehn, 2025). In turn, my queer-centered scholarship has led me to present with other scholars at academic conferences and to offer workshops with CVP colleagues at LGBTQ+-affirming events (e.g., the Penny Lane Centers' Edgy Conference).

As mentioned previously, the RPT process was not well-explained to me when I first started my faculty position,

which is only one of several challenges new academics face (Larson et al., 2020). It is essential that new faculty seek clarification on their departments' expectations for retention, organize files documenting their progress across all areas of evaluation, including flyers for attended events, and keep updated records of their teaching and scholarship progress. Seeking clarification early on in the RPT process from departmental colleagues, including the Department Chair and College Dean, is an important step to good preparation for one's evaluation. New faculty might also consider creating their own promotion opportunities aligned with departmental expectations, such as publishing in alternative formats and platforms, and participating in cross-departmental collaborations that advance their own initiatives. In the area of service, academics might seek to serve on impactful, community-oriented or professional committees aligned with their teaching or scholarship agenda when leadership-type roles are unavailable through departmental or university committees.

If considering service with NPOs, academic faculty should identify the specific needs of the organization and where they can contribute. NPOs may benefit from the expertise and unique skill sets of university faculty, including grant writing, consulting, or conducting professional development. That said, academics looking to serve the community alongside an NPO would benefit by partnering with organizations that can leverage the faculty members' expert experience in their fields. With over 30 years of teaching at multiple levels of education, extensive experience in K-12 schools, and a current position as a teacher educator at a public university serving the immediate community, I was well-positioned to help Central Valley Pride offer training modules for educators at local school districts that paired with the direct student services for LGBTQ+ youth. This ongoing collaboration with CVP benefits both the NPO by elevating its marketability through a broader range of services that address the needs of students and educators alike, while providing me with opportunities to exercise my professional strengths as a teacher educator.

Academics should be strategic in aligning the work they do for NPOs with what they can count toward their future RPT files. Further work I do with CVP is in grant writing. Researching and identifying appropriate donors, writing grant proposals that target our organization's specific needs, and following through with final grant reporting have all been skills that have benefited Central Valley Pride's ongoing efforts and have also helped me refine areas of my professional RPT file where I was lacking. Lastly, new faculty who partner with an NPO are more likely to continue collaborating when the service they provide aligns with their own interests and passions. While the service work I do with CVP can be laborious and time-consuming, it remains intrinsically fulfilling knowing that I am positively impacting the lives and educational experiences of LGBTQ+ youth in the communities we serve.

Reflective Questions for the New Academic-Advocate

It is important to be self-reflective and intentional when embarking on collaborative community service, and finding an NPO to partner with can be challenging. However, some initial preparation and info-seeking about the nonprofit organization can lead to a better understanding of the NPO's current mission, vision, and community work practices. Some self-reflective questions for new academics-advocates to consider when seeking NPO partnerships are: 1) What expertise and background knowledge do you possess for advocacy work, and what can you bring to the table? 2) What influence do you wish to make in your community through advocacy work? 3)

Why do you wish to invoke such a change, and what is the need in your community? 4) How can you tap into the potential and expertise of those around you to help build sustainable change within the nonprofit organization? 5) How can your service with the NPO help you build the “trifecta” in your RPT file by creating connections between teaching, scholarship, and service?

Implications

There is already extensive research on nonprofit organizations in the areas of leadership (Meyer, 2023), governance (Dicke & Ott, 2023), and strategic management (Tschirhart & Bielefeld, 2012), yet this study presents the author’s personal accounts with an NPO that focuses on serving the LGBTQ+ community in the high-need area of the Central Valley, California. With very little research existing in this area of NPOs, there is a need for more research that centers on the direct experiences of LGBTQ+ people working in nonprofit sectors to better inform future queer advocacy. Much of the research on those in the LGBTQ+ community tends to concentrate on deficient support systems and discrepant institutional practices affecting queer people. While understanding the negative impacts of homophobic and transphobic behavior is crucial to combatting systems of oppression toward the LGBTQ+ community, queer people are more than the victims of hate, discrimination, and bullying that the literature portrays them to be. Therefore, we need to highlight more LGBTQ+ advocacy in nonprofit sectors that uplift and empower communities through asset-oriented research, focusing on the vast contributions of queer people in society.

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A Pilot Implementation of Peer-Led Team Learning in An Undergraduate Operating Systems Course

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Abstract

Peer-Led Team Learning (PLTL) has been shown to support student engagement in STEM, yet its use in upper-level computer science courses remains limited. This paper reports an exploratory pilot implementation of PLTL in an undergraduate Operating Systems course, where structured peer-led workshops were integrated alongside traditional instruction. The study examined feasibility in this systems-focused setting and documented how survey respondents described the workshops' perceived influence on learning, confidence, motivation, and peer connection. Evidence comes from an end-of-quarter student survey completed by 9 of 29 enrolled students and a reflective survey completed by 2 peer leaders. Within this small volunteer sample, students reported positive perceived changes across all retrospective before/after items, with the strongest shift concerning connection to other students. End-of-quarter ratings were also strongly positive for peer connection, confidence, conceptual understanding, and overall course experience, while perceived effects on study strategies were more mixed. Overall, the paper offers a practice-oriented account of PLTL in an upper-level computer science course and identifies design considerations for future implementations.

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Introduction

Peer-Led Team Learning (PLTL) is a structured small-group learning approach that complements traditional course instruction. In PLTL, students work collaboratively on course-related problems under the guidance of a peer leader, typically a student who has previously succeeded in the course. Rather than lecturing or giving answers, the peer leader facilitates discussion and supports students as they reason through challenging material together. The model is intended to create an active and supportive learning environment in which students engage deeply with course content while also benefiting from peer interaction and collaborative problem solving (Gosser & Roth, 1998; Wilson & Varma-Nelson, 2016).

These goals are especially relevant in computer science, where retention and student belonging remain important concerns. Recent computing-education work has continued to track retention across undergraduate computing programs (Duran et al., 2021), while studies in computer science education have shown that sense of belonging is meaningfully connected to student outcomes (Krause-Levy et al., 2021; Moudgalya et al., 2021). Such concerns can be particularly salient in upper-level courses, where students face greater conceptual complexity, higher expectations for independent problem solving, and fewer built-in opportunities for collaborative engagement. In systems-oriented courses such as Operating Systems, students must reason about concurrency, synchronization, scheduling, memory management, and other interconnected ideas that are conceptually demanding and often difficult to visualize. As a result, these courses can challenge not only students' technical understanding but also their confidence and sense of connection to peers.

PLTL has been studied extensively in STEM education and has been associated with positive outcomes related to engagement, persistence, and student learning (Wilson & Varma-Nelson, 2016). In computer science, published work has focused primarily on introductory settings and retention- or participation-oriented initiatives (Horwitz & Rodger, 2009; Huss-Lederman et al., 2008; Lara et al., 2017; Murphy et al., 2011). Together, these studies suggest that PLTL can support student success in computing contexts. To our knowledge, however, little work has examined PLTL in upper-level systems-focused computer science courses.

This paper addresses that gap through a pilot implementation of PLTL in an undergraduate Operating Systems course, a course typically taken late in the computer science major. In this pilot, weekly workshops were integrated alongside the existing course structure and centered on lecture-related problem sets, collaborative discussion, and peer-led facilitation. The workshops were designed around core PLTL principles, including regular meetings, structured collaborative problem solving, and peer leaders who guided students without simply providing solutions. The goal was not only to explore whether PLTL could be implemented feasibly and sustainably in this context, but also to understand how students and peer leaders experienced the intervention.

This paper makes three modest contributions. It documents a PLTL implementation in an upper-level Operating Systems course, reports how student and peer-leader respondents perceived the workshops' influence on learning, confidence, motivation, and peer connection, and identifies design lessons related to facilitation, engagement, staffing, and activity structure. The study is intended as an initial account of feasibility and participant perceptions

rather than a test of causal effects.

Accordingly, this paper is guided by the following exploratory research questions:

How feasible is PLTL in an upper-level Operating Systems course?
How do students perceive its impact on learning, confidence, motivation, and peer connection?
How do peer leaders reflect on the implementation, including its benefits and challenges?

Background and Related Work

Originating in Workshop Chemistry, PLTL developed as a structured model of collaborative problem solving in which peer leaders facilitate small-group work that is closely tied to course content. Foundational and review work describes PLTL as a model built around guided discussion, student reasoning, and active engagement rather than answer delivery, and the broader PLTL literature has linked the model to improved student engagement and learning across STEM contexts (Gosser & Roth, 1998; Wilson & Varma-Nelson, 2016). Some studies also suggest that PLTL may be particularly valuable for students from groups that have historically been underserved in STEM. For example, Snyder et al. (2016) reported reduced failure rates for underrepresented minority students in an introductory biology setting that used PLTL.

Within computer science, PLTL-related work has primarily focused on introductory courses and broader participation or retention initiatives. Horwitz and Rodger (2009) described a multi-institution effort using PLTL to increase participation and success among underrepresented groups in introductory computer science. Murphy et al. (2011) reported lessons from a PLTL computer science program aimed at supporting recruitment and retention beyond the first course, while Huss-Lederman et al. (2008) presented PLTL as a promising approach for reducing drop rates and increasing student satisfaction in computer science. The present authors have also previously reported lessons learned from a PLTL implementation in a problem-solving course (Lara et al., 2017). Taken together, this body of work suggests that PLTL has shown promise in computing education, but published examples have centered largely on introductory or broadly participation-oriented contexts rather than upper-level systems courses. We found limited published work examining PLTL specifically in upper-level Operating Systems contexts.

This literature also connects to a second relevant line of work: belonging in computer science education. Moudgalya et al. (2021) emphasized the importance of measuring sense of belonging in introductory computer science settings, particularly for students from minoritized groups, and Krause-Levy et al. (2021) found that belonging is related to several student outcomes in computing courses. While these studies were not conducted in Operating Systems specifically, they highlight why a collaborative intervention such as PLTL may matter in computer science beyond purely cognitive outcomes. In other words, if belonging and social connection shape how students experience computing, then peer-led collaborative structures may be especially relevant in courses that students often perceive as difficult, isolating, or high stakes.

A final relevant strand of literature concerns active learning in technically demanding courses. Across STEM, a major meta-analysis found that active learning is associated with higher performance and lower failure rates than traditional lecturing (Freeman et al., 2014). In Operating Systems specifically, prior work has explored active-learning approaches and interactive tools to help students engage with abstract concepts. Perez-Martinez et al. (2010) examined active-learning methodologies in an Operating Systems course, and Yuan et al. (2008) studied visualization-based engagement in Operating Systems instruction. These studies do not examine PLTL directly, but they support the broader premise that systems courses may benefit from pedagogies that make difficult, process-heavy content more interactive and discussable.

Context and Implementation

Institutional and Course Context

This pilot was implemented at California Polytechnic State University, San Luis Obispo, a public university, in the Department of Computer Science and Software Engineering. The intervention took place in Fall 2025 in CSC 453: Introduction to Operating Systems, a required course for Computer Science majors. Although students may take the course at different points in the program, it is commonly completed late in the major and is often taken near graduation. The course enrollment cap was 30 students, and 29 students remained enrolled through the end of the term.

The course included both lecture and laboratory components and met across six 50-minute periods per week. In the pilot offering, the weekly schedule typically consisted of a longer lecture block on Monday, a lecture period and a traditional help-oriented lab period on Wednesday, and a Friday PLTL workshop occupying two 50-minute periods. In this way, PLTL was integrated into the existing course structure by repurposing part of the lab time rather than adding a separate optional support session.

Structure of the PLTL Workshops

PLTL was a required component of the course. Students could miss one workshop without penalty, but otherwise attendance and participation were expected. Workshops met once per week for all 10 weeks of the quarter, with one session each Friday from 8:10 a.m. to 10:00 a.m. Each session lasted 110 minutes and included a short break, although that break was not always used consistently.

The workshops were held in person in a computer laboratory with flexible space, access to student laptops, and extensive whiteboard availability. Students worked in a mix of formats depending on the activity, including coding, written work, and collaborative problem solving on whiteboards. This setting supported small-group discussion and allowed students to move easily between sketching ideas, discussing concepts, and testing code.

Students were organized into six groups of up to five students, and the groups remained fixed throughout the quarter. Groups were self-selected, a choice intended to support student comfort and peer connection in the workshops. Each group also remained with the same peer leader for the duration of the quarter.

Workshop Materials and Activities

Workshop materials were created by the instructor and aligned closely with the same week's lecture content. In some cases, the activities were also tied to course projects, so understanding the project description helped explain why particular problems had been included. The workshops were therefore designed not only to reinforce lecture topics but also to support the kinds of reasoning needed for subsequent project work.

Activities were mixed in format and included conceptual questions, written problem solving, code-related tasks, and collaborative whiteboard work. A typical workshop included three to five problems. Some sessions also included optional extra-credit problems. In retrospect, this was not an ideal design choice, as it sometimes encouraged students to rush toward the extra-credit items rather than engage more fully with the workshop as a whole. A better approach would be to keep completion expectations flexible without attaching extra credit to optional problems.

Students submitted evidence of their work at the end of each session. Depending on the task, submissions included code, written work, or photographs of whiteboard solutions uploaded through the course submission portal. PLTL counted for 20% of the total course grade. Grading was based on attendance, participation, and submission completion, not on correctness. In practice, students generally received full credit by attending and engaging with the activities.

Peer Leaders

The pilot employed three peer leaders, each responsible for two groups. One of these leaders also served as the general teaching assistant for the course, while the other two were hired specifically for the PLTL workshops. The teaching assistant worked up to 10 hours per week across all duties, including grading, office hours, and support in the remaining traditional lab section. The two PLTL-specific leaders worked up to 4 hours per week, including facilitation, preparation, and training. Peer leaders were paid at the standard ISA rate of approximately $17 per hour.

Peer leaders were selected based on prior success in the course and interest in the role. One had taken the course with the instructor in the previous academic year and had performed exceptionally well. The other two responded to a recruitment email and had completed the course previously with different instructors. Their primary responsibility during the workshops was to guide students, facilitate discussion, and help groups make progress without providing direct answers. This expectation was emphasized repeatedly. Leaders were also given facilitation guidance, including suggestions for how to steer discussion and what kinds of questions to ask to prompt student reasoning.

Training and Support

Peer leaders received introductory training before the quarter and ongoing support during the term. Before

implementation, they were given background material on PLTL principles and asked to design sample PLTL activities so they could better understand the structure of the workshops and the kinds of tasks students would encounter. Training was provided by the instructor during the previous term and focused on the goals and structure of PLTL, the role of the peer leader, and facilitation strategies based on questioning rather than answer delivery.

During the quarter, support varied somewhat by role. The main teaching assistant met regularly with the instructor, while the other peer leaders communicated primarily by email. These interactions focused mainly on reviewing upcoming workshop materials and clarifying expectations. More broadly, a more intensive and regular training structure would likely strengthen future implementations, particularly if experienced former PLTL leaders could help train new leaders.

Integration with the Course and Reproducibility

The workshops were closely integrated with the rest of the course. Activities were aligned with the same week's lecture material, although some workshops also introduced ideas that students would encounter more fully later in lecture, lab, or project work. The instructor referred to PLTL during lecture, and issues that emerged in workshops could inform later course meetings when unresolved questions or recurring difficulties became apparent. At the same time, the workshops remained intentionally peer led: the instructor was not present in the room during PLTL sessions, though available nearby if needed. This separation helped preserve the peer-led character of the workshops.

Several features of the implementation appear especially important for reproducibility. First, the model depended on weekly instructor-designed materials aligned with lecture topics and, when relevant, project goals. Second, a workable minimum staffing structure was one peer leader for no more than two groups, although smaller groups of three to four students would likely be preferable to the maximum group size of five. Third, the workshops benefited from a setting that supported active collaboration, such as a computer lab with whiteboards or, in an online implementation, multiple breakout rooms. Finally, the model required regular coordination, including approximately 1.5 to 2 hours of weekly planning and review, along with a submission platform for collecting student work.

The pilot also highlighted several design choices that others may wish to avoid. These include assigning too few peer leaders, making groups too large, including too many problems in a single session, scheduling workshops very early in the morning, and providing too little leader training. By contrast, self-selected groups appeared to work well in this context. Overall, the pilot was implemented with relatively limited resources, suggesting that PLTL can be carried out in a constrained setting, while also indicating that modest increases in staffing, training, and activity design could improve the experience.

Methods

This study used an exploratory, descriptive case-study design to examine student and peer-leader perceptions of a

pilot PLTL implementation in an undergraduate Operating Systems course. The aim was not to test effectiveness, but to document the intervention and characterize how participants who chose to respond described the experience. The PLTL intervention itself is described in the preceding Context and Implementation section. This framing is important because the evidence reported here consists primarily of voluntary, end-of-course self-report data rather than direct measures of learning gains or experimental comparisons. The study was approved by the Cal Poly Institutional Review Board.

Participants

The study took place in CSC 453: Introduction to Operating Systems during Fall 2025 at California Polytechnic State University, San Luis Obispo. The course enrolled 29 students, all of whom participated in PLTL because it was a required course component. Survey participation, however, was voluntary.

At the end of the quarter, 9 students completed the post-course student survey, representing 31.0% of the 29 students enrolled in the course. The pilot also involved 3 peer leaders, all of whom facilitated workshops during the quarter. A separate reflective survey was distributed to the peer leaders at the end of the term, and 2 peer leaders responded, representing 66.7% of the peer-leader group. These response rates should be kept in mind when interpreting the findings, because the views reported here may not represent the perspectives of all enrolled students or all peer leaders.

Data Collection

Two post-course surveys were used in this study: a student survey and a peer-leader reflective survey. Both were administered at the end of the quarter, after students had completed their coursework for the term. No incentive was offered for participation. This timing likely contributed to the relatively low response rate, since students were invited to complete the survey only after they had finished the course requirements. Accordingly, the survey data are best interpreted as voluntary end-of-course reflections rather than representative course-wide evaluations.

The student survey included both closed-response and open-ended items. In addition to background questions about major, year in school, peer-leader assignment, and PLTL attendance, the survey contained eight retrospective before/after items, nine direct end-of-quarter impact items, three comparison and endorsement items, and four open-ended prompts. The retrospective items used a 1-5 Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) and asked students to rate both BEFORE PLTL and NOW on statements about confidence solving multi-step problems, ability to break down complex problems, comfort asking questions, study habits for the course, connection to other students, belief in collaborative learning, motivation to keep up with course material, and confidence that they could do well in the course. Separate end-of-quarter items asked about perceived conceptual understanding, problem-solving skill, confidence, study strategies, connection to peers, motivation, peer-leader support, usefulness of worksheets and problems, overall course experience, whether PLTL improved learning relative to lecture and lab alone, and whether students would recommend or choose PLTL in future courses. Open-ended questions invited students to describe helpful aspects of PLTL, suggest improvements, and reflect on

confidence, motivation, and sense of belonging. Because these items were administered only once at the end of the quarter, they provide evidence about perceived change rather than direct pre/post measurement.

The peer-leader survey likewise combined closed-response and open-ended questions. In addition to background items, it included 1-5 Likert-scale questions about preparation and support, facilitation experience, observed student impact, peer-leader development, and overall satisfaction. These items asked, for example, whether peer leaders felt adequately trained, understood their responsibilities, could facilitate discussion without giving answers, observed increased student confidence or connection over time, and believed that serving in the role strengthened their own leadership and communication skills. Open-ended questions asked about rewarding aspects of leading PLTL, major challenges, helpful supports, and suggestions for program improvement. Together, the two surveys were intended to capture both student perceptions and peer-leader perspectives on the pilot implementation. Because both instruments were designed for descriptive use in a small pilot, the analysis emphasizes response patterns and recurring themes rather than formal statistical inference.

Data Analysis

Survey data were analyzed descriptively. Given the small sample size, the voluntary nature of survey participation, and the pilot character of the instruments, Likert-type responses were summarized primarily as counts, percentages, and means at the item level rather than combined into formal scales or analyzed inferentially. For the retrospective before/after items in the student survey, responses were interpreted as indicators of perceived change rather than as direct measures of learning gains. Accordingly, the analysis emphasizes trends in student perception, such as reported peer connection, confidence, motivation, and perceived learning support, rather than formal statistical inference.

Responses to open-ended questions were reviewed qualitatively and grouped into recurring descriptive themes aligned with the survey prompts. For student comments, these themes included collaboration, lower-pressure question asking, peer connection, confidence with course material, and suggestions related to staffing and materials. For peer leaders, themes included facilitation, student engagement, group dynamics, and practical challenges related to timing, staffing, and materials. Representative quotations were then selected to illustrate these themes in the Results section. This qualitative analysis was intended to support descriptive interpretation of the pilot rather than formal qualitative generalization or exhaustive thematic coding. Because this was a single-course pilot with a small number of survey responses and no control group, the analysis is intentionally modest in scope. This study is exploratory and descriptive and is not intended to establish causal effects of PLTL on student outcomes. Instead, it is intended to provide an initial account of feasibility and perceived value that can inform future implementations and larger-scale evaluations.

Results

Retrospective Student Perceptions

Nine students completed the post-course student survey. Because this represents a subset of the enrolled class, the

findings below should be interpreted as the perceptions of survey respondents rather than as course-wide conclusions. Within that small volunteer sample, responses suggested positive perceived changes across all retrospective before/after items, with the strongest reported shift related to students' connection to their classmates.

Table 1 summarizes the retrospective before/after ratings. Connection to peers showed the clearest perceived change, rising from a mean of 2.22 before PLTL to 5.00 after PLTL. Before participating in PLTL, five respondents disagreed that they felt connected to other students in the class, whereas after PLTL all nine respondents strongly agreed that they felt connected to their peers. A similarly strong shift appeared for students' belief that collaborative learning would help them succeed, which increased from a mean of 2.89 before PLTL to 4.78 after PLTL.

Table 1. Retrospective PLTL Ratings

Item	Before Mean	Now Mean
Confidence solving multi-step problems	3.00	4.33
Breaking down complex problems	3.33	4.33
Comfort asking questions	3.22	4.56
Effective study habits	3.22	4.11
Connected to other students	2.22	5.00
Collaborative learning helps me succeed	2.89	4.78
Motivated to keep up with course material	3.78	4.56
Confidence doing well in the course	3.11	4.33

Students also retrospectively reported greater comfort asking questions about course material (3.22 before, 4.56 after), stronger confidence solving multi-step problems (3.00 before, 4.33 after), and a greater ability to break down complex problems (3.33 before, 4.33 after). Retrospective ratings also became more positive for motivation to keep up with course material (3.78 before, 4.56 after) and confidence that they could do well in the course (3.11 before, 4.33 after). Perceived effects on study habits were positive but more mixed than the perceived effects on peer connection, confidence, and motivation: the mean rose from 3.22 before PLTL to 4.11 after PLTL, but responses remained more dispersed than those for the strongest items.

End-of-Quarter Student Evaluations

Students also rated the direct end-of-quarter items positively, as shown in Table 2. The strongest ratings concerned peer connection, confidence, and conceptual support. All nine respondents strongly agreed that PLTL helped them feel more connected to other students. Students also rated PLTL very positively for increasing confidence in the subject (mean = 4.89), deepening understanding of course concepts (4.78), creating a supportive learning environment (4.78), and improving their overall experience in the class (4.67).

Ratings were likewise strong on the item asking whether PLTL improved learning relative to lecture and lab alone (4.67), as well as on the items asking whether students would recommend PLTL to future students (4.89) and whether they would take another course that includes PLTL (4.78). Students also viewed the worksheets and

problems positively (4.44) and reported that PLTL supported problem-solving skills (4.44) and motivation to stay engaged in the course (4.56). As in the retrospective data, the weakest item concerned study strategies (3.78), suggesting that respondents perceived PLTL as especially valuable for collaborative, affective, and conceptual aspects of learning rather than as a major driver of independent study habits.

Table 2. End-of-Quarter PLTL Ratings

Item	Mean
PLTL helped me understand course concepts more deeply	4.78
PLTL improved my problem-solving skills	4.44
PLTL increased my confidence in this subject	4.89
PLTL helped me develop better study strategies	3.78
PLTL helped me feel more connected to other students	5.00
PLTL motivated me to stay engaged in the course	4.56
My peer leader created a supportive learning environment	4.78
The PLTL worksheets/problems were useful for learning	4.44
Overall, PLTL improved my experience in this class	4.67
Compared to lecture/lab alone, PLTL improved my learning	4.67
I would recommend that future students participate in PLTL	4.89
I would take another course that includes PLTL	4.78

Qualitative Student Feedback

Students' written responses provide additional detail about what they found most valuable in the PLTL workshops. Many comments emphasized collaboration as one of the most helpful aspects of the experience. One student remarked that collaboration and having a good group really helped, while another highlighted the value of open engagement and conversation with teammates. Several students also noted that the stable grouping structure mattered; one respondent wrote that having the same group the whole time made the team feel like a real software team.

Students also drew attention to the value of the peer-led format itself. One respondent noted that being able to ask peers about problems they did not understand in a pressure-free way was especially helpful, particularly because the leader was also a peer. Another explained that PLTL made it easier to ask quick sanity-check questions that would otherwise be held back in a professor-centered setting. These comments align with the survey results, showing strong perceived gains in comfort asking questions and peer connection.

Written reflections also emphasized confidence, motivation, and classroom community. One student wrote that PLTL made them more confident to ask questions, while another said that it significantly boosted confidence in the material and in going into other class assignments and tests. Others connected PLTL to motivation and peer connection, explaining that the group made it more motivating to attend each session and that their confidence and sense of belonging increased as they got to know their group mates better. Taken together, these comments

reinforce the interpretation that one of the most salient perceived benefits among respondents was the creation of a lower-pressure, collaborative learning environment.

Students also identified areas for improvement. One respondent suggested that more PLTL leaders would be helpful because their leader had to jump back and forth between groups, making questions harder to ask at times. Others suggested supplementary supports, such as slideshow-based materials, sample programs or coding resources, or more deliberate group formation. These comments point to practical refinements that may strengthen future iterations of the model.

Peer Leader Reflections

Two peer leaders completed the reflective survey. Overall, their responses were positive and suggested that they viewed PLTL as beneficial both for students and for their own development in the role. Both peer leaders agreed or strongly agreed that they were adequately trained, received enough support, understood their responsibilities, felt comfortable facilitating discussions, and were confident helping students reason through problems without simply giving answers. Both also reported strong satisfaction with the role and said they would recommend becoming a PLTL leader to other students.

Peer leaders also perceived clear benefits for students. Both strongly agreed that PLTL improved students' understanding of key concepts, helped students feel more connected to one another, and increased students' confidence in the course material. Both also agreed that PLTL supported students' problem-solving skills. In addition, both reported strong gains in their own leadership, communication, and facilitation skills.

At the same time, the peer leaders identified several challenges in implementation. One recurring issue involved uneven participation within groups. In an open-ended response, one leader explained that deciding how strongly to require less-participatory students to engage was difficult, especially when others in the group would benefit from broader discussion. Another challenge involved facilitation across multiple groups: one respondent noted that it was difficult to manage discussion for two disconnected groups simultaneously and suggested that, ideally, each group would have its own leader. Peer leaders also mentioned practical constraints such as the early morning start time and wanting earlier access to workshop handouts. Taken together, the peer-leader reflections broadly align with the student survey results while also highlighting implementation issues that are less visible in student responses alone.

Discussion

Feasibility

This pilot suggests that PLTL can be implemented in an upper-level Operating Systems course with relatively modest resources and in ways that students and peer leaders perceive as valuable. The workshops were incorporated into existing course time, used instructor-developed materials aligned with the course, and were supported by a small peer-leader team. At the same time, the pilot makes clear that feasibility depends on

surrounding conditions, not only on adoption of the pedagogical model itself. Staffing ratios, workshop timing, activity scope, and the regularity of leader support all shaped the quality of the experience.

The most practical implementation lesson concerns staffing. Both students and peer leaders noted challenges when a leader had to divide attention across multiple groups. This suggests that one leader per group, or at least fewer groups per leader, would better support facilitation and participation. The pilot also indicates that large packets, extra-credit items, and very early scheduling can work against the discussion-oriented aims of PLTL even when students value the overall model.

Perceived Learning Support, Confidence, and Peer Connection

The student survey results suggest that respondents experienced PLTL as especially supportive of peer connection, confidence, and conceptual engagement. The clearest pattern was the reported shift in connection to classmates, which was also echoed in open-ended comments about collaboration, stable groups, and lower-pressure question asking. In a course that students often experience as technically demanding and sometimes isolating, that social dimension may be especially important.

Respondents also described greater confidence solving multi-step problems, more comfort asking questions, and stronger confidence in doing well in the course. End-of-quarter items likewise suggested perceived support for conceptual understanding and confidence, consistent with the broader literature on active and collaborative learning in STEM contexts (Freeman et al., 2014; Wilson & Varma-Nelson, 2016).

By contrast, study strategies received the weakest ratings in both the retrospective and end-of-quarter items. That pattern suggests that respondents experienced PLTL more as a collaborative and confidence-building structure than as a major influence on independent study habits.

Practical Implications

Although students and peer leaders described the workshops positively overall, they also identified several practical issues that can inform future implementations. First, staffing levels matter. Increasing the number of peer leaders so that each leader supports only one group, or at least fewer groups, may allow for more focused facilitation and better support for quieter or less engaged students. Second, activity design should better match available time. Shorter packets, fewer problems, and more intentionally discussion-oriented prompts may better support the collaborative goals of PLTL. Third, workshop materials may benefit from including more programming-related examples and resources in addition to conceptual problem sets. Finally, scheduling and leader preparation also emerged as important considerations. Peer leaders noted that the early morning workshop time may have affected student energy and attendance, and stronger, more regular leader preparation could improve facilitation consistency across the quarter.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, it reports on a single pilot implementation in one upper-level Operating Systems course at one institution. The intervention was examined in a specific local context, with a particular instructor, course structure, and peer-leader model. As a result, the findings are context specific and cannot be assumed to generalize to other computer science courses, institutions, or student populations without further study.

Second, the study is based on a relatively small number of survey responses. Although 29 students were enrolled in the course, only 9 completed the post-course student survey, and 2 of the 3 peer leaders completed the reflective survey. This low response rate limits representativeness and raises the possibility of response bias, since participants with particularly strong experiences may have been more likely to respond. The timing of the survey may also have contributed to this limitation, as it was administered only after students had completed all coursework for the term and no incentive was offered for participation.

Third, the study relies primarily on self-reported perceptions rather than direct measures of learning gains. The student survey captured how participants viewed the effects of PLTL on confidence, peer connection, motivation, and learning, but such perceptions do not necessarily correspond directly to changes in academic performance. In addition, the survey used retrospective before/after items administered at the end of the term rather than a true pre/post design. This post-only approach may have introduced recall bias and may also have been shaped by students' overall impressions of the course. The survey instruments also relied on course-specific items tailored to the pilot context rather than on full validated scale batteries for each construct, so categories such as peer connection, confidence, and study habits should be interpreted as descriptive indicators rather than precise psychometric measures.

Fourth, the study does not include a control group or a concurrent comparison condition. Because all students in the pilot course participated in PLTL as a required component, it is not possible to determine whether the reported benefits were caused by PLTL itself or were influenced by other aspects of the course, the instructor, the cohort, or the broader learning environment. For this reason, the findings should be understood as exploratory and descriptive rather than causal.

Taken together, these limitations position the study as an initial account of feasibility and perceived value rather than a definitive evaluation of impact. Future work with larger samples, prospective pre/post measures, stronger comparison data, and, where appropriate, more standardized instruments for constructs such as peer connection and confidence will be needed to build a stronger evidence base.

Conclusion and Future Work

This pilot suggests that PLTL can be implemented productively in an undergraduate Operating Systems course. Among survey respondents, the most salient perceived benefit was stronger connection to peers, alongside positive

perceptions of confidence, motivation, and learning. The paper's contribution is practical: it documents one implementation and highlights design choices that may help future iterations.

The pilot also pointed to clear refinements, including shorter workshop packets, more peer leaders, and stronger leader preparation. Future work should test those refinements with larger samples, prospective pre/post measures, stronger comparison data, and attention to how the model functions across instructional modalities.

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Public Administration Under Constitutional Review: Proportionality, Judicial Oversight, and the Rule of Law in Albania

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Abstract

Public administration must assess situations from a constitutional perspective before adopting decisions in the public interest, identifying objectives, determining means, and selecting the most appropriate and effective one. In constitutional and administrative law, this methodological approach is embodied in the principle of proportionality, which requires public authorities to refrain from infringing individual rights, avoid discrimination, and respect constitutional principles. Although distinct, constitutional law and administrative law share the objective of protecting human rights and preventing abuses by public administration, with judicial review serving as the primary mechanism for ensuring legality and constitutionality. In Albania's tripartite system of powers, public administration occupies a complex position, generating tensions and reciprocal checks among the branches. This paper examines the role of the Constitutional Court of Albania in interpreting administrative activity within its constitutional review function, based on cases initiated by constitutionally authorised subjects. The Court's jurisprudence has addressed various aspects of administrative action, shaping the constitutional boundaries of public administration. Its oversight significantly affects the effectiveness, efficiency, legality, and fairness of administrative decision-making and promotes harmonisation of administrative principles with constitutional requirements and the rule of law.

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Introduction

The Constitution of the Republic of Albania establishes a tripartite system of separation of powers, within which public administration occupies a position that is neither clearly delineated nor easily accommodated. This constitutional arrangement inherently generates structural tensions, conflicts, and reciprocal disagreements among the three branches of government, namely, the executive, legislative, and judicial powers. Public administration operates through a variety of institutional forms and oversight mechanisms, including the Ombudsman, the High State Audit, the Prosecution Office, and the courts. Nevertheless, the constitutional control of administrative activity, particularly through the Constitutional Court ("CC"), remains a complex and delicate process, often accompanied by institutional friction and overlaps of authority, as well as comparative challenges observed in other legal systems.

Within this context, public administration must possess a comprehensive analytical capacity, including constitutional assessment, prior to adopting administrative decisions. In practical terms, it must first clearly identify the objectives it seeks to achieve, which correspond to the concept of public interest and the pursuit of the common good. Second, it must determine the means by which these objectives are to be attained, ensuring not only that the purpose is lawful, but also that the instruments employed are legally appropriate. Third, when multiple means are available, it must select the most suitable one to achieve the intended outcome. In constitutional and administrative law, this evaluative framework is embodied in the principle of proportionality, which constitutes one of the most fundamental principles governing administrative action. The principle imposes a duty on public authorities to avoid unjustified interference with individual rights, to prevent discrimination, and to respect other constitutional values in the exercise of administrative powers.

The motivations and justifications underlying legislative initiatives undertaken by the Council of Ministers (government), whether through the proposal of laws or the issuance of normative acts by the executive branch, including the Council of Ministers and individual ministers, may be diverse. These motivations may encompass political considerations, alongside social, economic, and legal factors dictated by public needs in specific sectors. The increasing frequency of regulatory intervention through legal and normative acts intensifies constitutional scrutiny over administrative activity. Consequently, constitutional review directly affects the achievement or non-achievement of administrative objectives, depending on the Constitutional Court's jurisprudence.

The Importance of Understanding Constitutional Review

The constitutional obligation of public administrators is to implement the law understood, first and foremost, as the highest law in the legal order, namely the Constitution, and to serve the people. Public administration may adopt different approaches in the exercise of its administrative decision-making; however, its choices are constrained by the Constitution and, moreover, by oversight from the Constitutional Court ("CC"). For this reason, public administration must understand the significance of constitutional review.

The Constitutional Court has established constitutional standards, confirmed through its jurisprudence in resolving

specific cases, that simultaneously serve as guiding criteria for assessing and sanctioning public administrative activity. In general, the conduct of public authorities falls within the scope of constitutional review, depending on their procedural position as interested parties in abstract review of normative acts and concrete review of laws (understood to include the Council of Ministers or any public institutions acting as an interested party), as well as within the review of due process in relation to fundamental rights. This review may occur either directly, through the decision-making of non-judicial authorities, or indirectly, through judicial decisions that examine the actions of administrative bodies.

The constitutional review of "administrative activity" by the Constitutional Court, beyond its classical role of reviewing laws as legislative acts, is carried out in several dimensions: (i) review of normative acts of central and local authorities, as well as individual acts of the Council of Ministers in cases involving the dismissal or dissolution of local government bodies; (ii) review of administrative or *quasi-administrative* proceedings; (iii) review in cases of disputes over competences, where the conflict arises as a result of an administrative act or an omission by the authorities involved, that is, where the conflict does not originate from a legislative act; (iv) due process in the administrative sphere/right to a fair process (articles 131 and 134 of the Albanian Constitution).

In all categories of its decisions and in every individual case, the Constitutional Court interprets the Constitution by elucidating the meaning of specific constitutional provisions. Public administration is therefore obliged to use the decisions of the Constitutional Court as sources of administrative law, as these decisions articulate concrete reasoning and formalise the Court's position on the matter at issue, while simultaneously providing authoritative interpretations of constitutional norms. As the Court has emphasized, given that constitutional norms acquire practical reality through interpretation, namely through the Court's decision-making process, the Constitutional Court undoubtedly constitutes a source of law. Moreover, it represents a primary source of law, considering that Article 4 of the Constitution stipulates that the Constitution is the highest law in the Republic of Albania (Decision no. 20/2011, Constitutional Court of Albania).

In adjudicating administrative matters, public administration must adhere to the reasoning developed by the Constitutional Court regarding constitutional norms, principles, and values.

Public administration must also be aware that constitutional values should guide its efforts to achieve maximum efficiency and effectiveness. Human dignity constitutes one of the core constitutional values enshrined in the Preamble of the Constitution, alongside due process of law, equality before the law, legal certainty, and proportionality, all of which represent constitutional requirements and standards.

Although public administration employees are not expected to be constitutional law specialists, public administration as a whole must be educated in constitutional standards, which it is obliged to respect in the exercise of its functions. Without such education, public administration cannot be expected to be competent or professional. The objective is not for public administration to acquire detailed expertise in constitutional review, but rather to develop a broad familiarity with constitutional values and principles and to design public policies that place the Constitution at their core.

Constitutional Jurisprudence on Certain Aspects of Administrative Activity of Public Administration

The Constitutional Court influences the effectiveness of public administration, its efficiency, lawful and fair decision-making, and the standardisation of administrative principles and values. Public administration may undergo a profound transformation precisely as a result of constitutional requirements, which are extensively reflected in constitutional provisions and in the jurisprudence of the Constitutional Court.

More specifically, in its decision concerning a Decision of Council of Ministers on unauthorised constructions, the Court stated that: “The individual’s right to due process of law is not limited solely to judicial proceedings, but also extends to administrative proceedings. In this regard, every public authority, in the exercise of its constitutional and legal functions, is obliged to respect the generally accepted democratic standards related to due process, which are reflected in the Constitution. The Court has further stated that the constitutional parameters guaranteeing the right to due process of law must, first and foremost, be provided for in procedural legislation and, subsequently, must be implemented by public administration bodies through the application of legal provisions, specifically those of the Code of Administrative Procedures (CAP). In this context, compliance with due process standards is ensured through the concrete application of procedural rules by administrative authorities (Constitutional Court of Albania, Decision no.35/2023).

Regarding the public interest at stake, when government took actions of limiting working hours of medical staff, working full time in public sector, but being engaged in private sector, the court has stated “…the list of matters of public interest can in no way be exhaustive, since public interest must be understood in a relative sense, depending on the different situations that arise.” Also, in the same decision the court explained that proportionality test requires that public interest need for to reach some legitimate objectives, should respect the constitutional standards of limitations of fundamental rights foreseen in article 17 of the Constitution, exactly the measure must be capable of achieving the objective; must be necessary, meaning no less restrictive alternative exists to achieve the same goal; the burden imposed on the individual must not be excessive in relation to the benefit gained. (Constitutional Court of Albania, Decision 58/2025).

The Constitutional Court also exercises oversight over public administration regarding the implementation of the legislation in force governing employment relationships within the public administration. As a result, a certain degree of tension may arise between public administration and its employees' constitutional rights. In Decision no. 13/2011, the Constitutional Court stated that: *“…public administration, as the authority responsible for implementing the legislation in question, in order to apply the concept of the waiting list as accurately as possible, must comply with certain standards of transparency, such as the existence of a waiting list, the registration of employees on the waiting list, the identification of those employees, and their notification regarding placement on the waiting list. According to this Court, informing the interested parties of the content of an individual administrative act, particularly of the legal consequences deriving therefrom, constitutes an element that guarantees due process of law, as well as the constitutional right of citizens to information and transparency.”*

In a case concerning the annulment of decisions of the Council of Ministers aimed at preventing nepotism and limiting the influence of power over the recruitment and career advancement of public administration personnel, the Council of Ministers argued that the adoption of those decisions was justified by the prevailing conditions of corruption within the public administration. According to the Constitutional Court, the decisions were unconstitutional, as the restrictions had not been imposed by law in accordance with Article 17 of the Constitution. Moreover, even if such restrictions had been established by law, the Court held that the decisions would still have failed to comply with the principles of proportionality and legal certainty.

Furthermore, the Constitutional Court emphasised that: *"…the freedom to choose and exercise a profession is not merely a right to have a job. It should not be understood solely as a social right, but also as a negative liberty that precludes state interference or obstruction in its exercise. (…) "The unconstitutionality of the decisions does not lie solely in the fact that the decisions of the Council of Ministers produce effects on legal relationships established prior to their adoption, but also in the failure to respect the principle of proportionality, since the employees affected by these decisions are not provided with alternative employment."* (Constitutional Court of Albania, Decision no.20/2006)

According to a classical definition of "Public administration", the fundamental objective of administrative science is the conduct of administrative activities with the minimum possible expenditure of material and human resources, (Gulick, L., & Urwick, L., 1990, p. 96). Efficiency, therefore, lies at the core of the principles governing the functioning of public administration. However, even with regard to this administrative element, the Constitutional Court imposes oversight and standards, since efficiency, as an administrative value, is itself subject to constitutional values.

In a case concerning the overlapping of institutional structures in the context of the competences and functions of local authorities vis-à-vis those of central authorities, and consequently the issue of efficiency, the Constitutional Court held that: *"Local self-government units cannot be excluded from the exercise of their competences by central government authorities, as they possess their own sphere of activity as provided for by the Constitution."* (Constitutional Court of Albanian, Decision no.3/2009).

The Constitutional Court has consistently emphasised the responsibility of superior authorities for unconstitutional or unlawful actions committed by subordinate bodies, based on the principle of hierarchy, which constitutes one of the fundamental principles governing the functioning of the state administration. In this regard, the Constitutional Court has stated that: *"Given that it is a functional duty of the superior authority to monitor and supervise the activity of subordinate bodies, and to adopt the appropriate measures to ensure that their functioning is in accordance with the legislation in force, the failure to exercise these powers—whether to guarantee the rights of citizens or to correct the errors of the subordinate body through vertical intervention—gives rise to the responsibility of the superior authority.*" (Constitutional Court of Albania, Decision no.6/2011).

The standards established by the Constitutional Court concerning due process of law —extending beyond judicial proceedings to include administrative proceedings—have a significant impact on public administration. These

standards must also be applied in administrative procedures in order to ensure that such proceedings are concluded within optimal time limits and that administrative decisions are reasoned, fair, and lawful.

Regarding the reasoning of administrative decisions, the Constitutional Court has clarified that it constitutes an essential element of a fair decision. The arguments set out in a decision must be sufficient to support and justify its operative part. The conclusions of the reasoning must be based not only on legal provisions, but also on the principles and rules that characterise sound and logical reasoning. Moreover, reasoning should not be understood as requiring a detailed response to every argument raised; rather, the extent and form of reasoning vary depending on the circumstances of the case and the nature of the decision (Constitutional Court of Albania, Decision no.25/2011).

The Constitutional Court has further emphasized that the reasonableness of the duration of proceedings must be assessed in light of the specific circumstances of each case, taking into particular account: (i) the complexity of the case; (ii) the conduct of the applicant; (iii) the conduct of the authorities; and (iv) what is at stake for the applicant. (Constitutional Court of Albania, Decision no.18/2005, no.1/2009, no.33/2021). In assessing the complexity of proceedings, all aspects of the case are relevant, including the subject matter of the dispute, the contested facts, and the volume of documentary evidence, but the conduct of public and administrative authorities must be as a constitutional roadmap for these subjects.

With regard to the execution of final judicial decisions, the Constitutional Court has stressed that, to effectively protect human rights and establish the rule of law, administrative authorities are obliged to enforce final and binding court decisions. When administrative authorities refuse, neglect, or delay the execution of such decisions, the guarantees enjoyed by a party involved in judicial proceedings lose their purpose. The fact that state authorities eventually comply with a decision after a substantial delay cannot, in constitutional terms, be considered to automatically deprive the applicant of the status of a person whose rights have been violated. No state authority may call into question the correctness or fairness of final judicial decisions; rather, it is obliged to take all necessary measures to ensure their execution. Consequently, public administration must develop an active interest in becoming familiar with the jurisprudence of the Constitutional Court, thereby endowing its administrative activity with a “constitutional dimension.”

Public administration and public administrators are not exempt from liability when the rights and legitimate interests of individuals are harmed; this includes liability arising from a lack of constitutional knowledge or constitutional negligence. The Constitution, article 44, provides that everyone has the right to rehabilitation and/or compensation in accordance with the law if they have suffered harm as a result of an unlawful act, action, or omission by state authorities. Under these circumstances, public administration faces the risk of incurring liability and paying compensation if it violates individuals' constitutional rights, according to article 44 of the Constitution.

The separation and balancing of powers, as a highly complex principle that underlies not only the division of powers but also their cooperation, may give rise to structural tensions, conflicts, and mutual disagreements among the three branches of government. More specifically, in a case before the Constitutional Court, a legal provision

that vested the appointment and dismissal of the Chancellor—an administrative function within the judiciary—in the Minister of Justice was challenged. The Association of Judges, acting as the applicant, argued that this arrangement violated the principle of separation of powers and the balance of powers. The Constitutional Court partially rejected the claim that the executive branch had interfered with the judicial power, instead upholding the executive's position on the basis of the principle of checks and balances. The Court held that the appointment of the Chancellor by the Minister of Justice does not undermine the independence of the judiciary, but rather serves the purposes of oversight and accountability in the administration of justice, a domain within the competence of the executive branch. (Constitutional Court of Albania, decision no.20/2009). Throughout its jurisprudence, the Constitutional Court has consistently emphasised that the formulation of state policies and legislative initiatives belongs to the executive and legislative branches, provided that the independence of the judiciary remains unaffected (Constitutional Court of Albania, decision no.11/2010).

The Constitutional Court has consistently affirmed that the principle of the rule of law constitutes one of the cornerstones of a democratic state and society and represents an autonomous constitutional norm. Its violation, per se, is sufficient to justify a declaration of unconstitutionality of a law. Moreover, the Court has clarified that the exercise of state functions is not limited exclusively to state institutions but may also be delegated, by law, to non-state entities entrusted with the performance of specific public functions. Such delegation is constitutionally acceptable only where a system of professional self-regulation and self-governance is ensured, guaranteeing accountability, representation, and effective oversight. In the absence of these guarantees, the delegation of public functions to private actors would be incompatible with constitutional standards and the principle of the rule of law (Constitutional Court of Albania, Decision no. 7/2010).

The relationship between state regulation and the self-regulation of certain professions governed by public law may likewise give rise to constitutional tensions; consequently, the Constitutional Court exercises its oversight and establishes constitutional standards in this area as well. There are economic activities that fall within the scope of Article 11 of the Constitution and are thus conducted in accordance with the rules of the free market. Other activities, however, are subject to restrictions due to the public interest they serve and, accordingly, may be subject to state intervention. Such intervention may occur, for example, in the case of professional services, where the characteristics of the market for this category may be summarized as follows: (i) professional activities often enjoy a legal monopoly in the provision of their services; (ii) access to many professions is subject to regulatory control, with the state determining admission criteria and the legal requirements for entry into the profession; and (iii) these activities are subject to the determination of mandatory prices and fees for their services. It is the legislature that decides to confer professional status upon a particular occupation and to designate it as a self-regulating body. Likewise, the legislature selects the model of access to the profession, ensuring coherence as well as equal treatment of applicants or candidates for these professions (Constitutional Court of Albania, decision no.10/2008).

A particularly complex relationship arises between individuals' constitutional rights and budgetary constraints and limitations. Pursuant to Article 17, a right must first exist before it may be subject to limitations in the public interest, one such limitation being the state's budgetary constraints in fulfilling and protecting that right. A

distinction must be drawn between policy-making and policy implementation, which correspond to two principal functions: political and administrative.

The concrete structure of public policies, encompassing both their formulation and execution, reveals that politics and administration are not two separate bodies with absolute distinctions, but rather two components of the same process. Public policies are formulated and subsequently implemented; however, in certain cases, they may be implemented first and then further shaped (Richter, & Burke, 2004, p.36). Nevertheless, the clearest distinction between politics and public administration lies in the principle of impartiality, which requires neutrality between the actions of the “government”—which, in parliamentary democracies, is linked to the interests of a political party representing the parliamentary majority—and the actions of public administration. In implementing the political directives of the majority, public administration must act without political bias to fulfil the defined public functions. Accordingly, an important constitutional standard is that public administration must be politically neutral. This requirement, however, must be balanced against the constitutional rights of public officials, such as freedom of expression, freedom of political activity, and freedom of association.

Conclusions

From the foregoing analysis, it becomes evident that public administration may be subject to profound institutional or procedural transformation precisely as a result of constitutional requirements and standards. Perhaps one of the most significant tensions faced by public administrators and executive bodies is the implementation of their politically defined mandate within constitutional constraints. As previously discussed, certain administrative principles and concepts possess constitutional status; consequently, any administrative activity carried out by the public administration must be capable of withstanding a test of constitutionality if challenged before the courts.

From this perspective, by elaborating and clarifying such concepts, the Constitutional Court guides and reinforces the interpretation of administrative notions for public administration bodies, which are therefore required to become familiar with and apply them. Only in this manner can public administration avoid delays or the undue prolongation of the exercise of its constitutional functions as a result of constitutional review of its initiatives. Moreover, public administration must align its regulatory activity in adopting secondary legislation with the standards established by the Constitutional Court, including in cases where the Court’s decisions concern the review of laws. This obligation is grounded in the principle of the rule of law, according to which no public authority may act contrary to the decisions of the Constitutional Court and must comply with them. Ultimately, only by integrating constitutional values into its executive and law-implementing activities can public administration achieve greater alignment with constitutional requirements and, consequently, with the demands of the rule of law and the welfare state, as proclaimed in the Preamble to the Constitution of the Republic of Albania.

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Addressing the Adolescent Habit Gap: An Evidence-Based Framework for Intergenerational Habit Formation Supporting Teen Independence and Confidence

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Abstract

While 86% of parents report preparing their adolescents for adult independence (Minkin et al., 2024), a critical gap remains: 84% of hiring managers report that high school graduates lack workforce readiness (U.S. Chamber of Commerce & College Board, 2025). This paper considers the current state of adolescent mental health and workforce readiness and introduces an evidence-based, neurodivergent-informed educational framework addressing the adolescent "habit gap." Through intergenerational partnership, calendar-based microlearning, and habit formation research (Clear, 2018; Pickhardt, 2013; Singh et al., 2024), the authors consider how to address the current concern that exists for parents, educators, employees, hiring managers, and organizational leaders across the globe. Applying multiple studies, theories, and scientifically proven concepts, the framework translates theory into actionable practice. Harvard's 85-year happiness study, Self-Determination Theory, and neurodivergent-informed strategies are embedded in the 2–7 minute daily micro-activities delivered via ubiquitous calendar technologies requiring asynchronous parent–teen participation while preserving adolescent autonomy. Central to the model, adolescents are positioned as co-designers rather than passive recipients, supporting developmental needs for autonomy, competence, validation, and relatedness while providing structured habit-stacking opportunities. These collaborative habit-building systems prepare adolescents for adulthood through transferable, evidence-based daily practices applicable across educational, counseling, and organizational contexts.

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Introduction

Despite 86% of parents stating they did at least a “fair amount” to prepare their children to be independent adults (Minkin et al., 2024), 84% of hiring managers agree that high school students are not prepared to enter the workforce (U.S. Chamber of Commerce & College Board, 2025). Students agree. 72% of students report they are not ready for life after high school (YouScience, 2025). Parents, teachers, and students spend the entire life of a child raising them up with thoughts and hopes for success. There is a gap between what is ideal and what has become reality.

Schools are working to teach students the skills they need to succeed. However, there is a gap between the perception of what educators and government agencies believe students need and the reality of what youth and hiring managers require for successful independence and readiness post-education. When students graduate high school, many have spent over 16,000 hours in a classroom (Kraft et al., 2025). In the United States, the Common Core State Standards are the current guideposts for education and are issued to “help ensure that all students are college and career ready in literacy no later than the end of high school” (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). However, 32% of twelfth-grade students performed below the NAEP Basic level in reading, meaning they likely could not reliably locate and identify relevant details in-text to support literal comprehension (National Center for Education Statistics [NCES], 2024). This assessment included a nationally representative sample: 24,300 students from 1,500 schools (NCES, 2024).

Hiring managers, CEOs, and employees are also feeling negative effects of the lack of workforce readiness skills. Of 500 small, mid-sized, and large company hiring managers, “few” high school graduates have the soft skills required for workforce readiness, but 94% suggest more critical thinking/problem solving skills, 90% advise more communication skills, and 96% say more financial literacy skills are needed (U.S. Chamber of Commerce & College Board, 2025). 350 hiring managers surveyed report that only 8% of college graduates are workforce-ready (Burleigh, 2025), suggesting that college graduates are spending four or more years learning technical skills but are missing the key components needed that would give them confidence and help them transition smoothly into the independent adult stage of their lives.

This translates into what is happening in the global employee workforce: Learning and development professionals report that human skills (such as communication, collaboration, and adaptability) are increasingly important to organizational success (LinkedIn Learning, 2025). The World Economic Forum reports perceived “skill instability” and that 39% of existing workers’ skill sets “will be transformed or become outdated over the 2025-2030 period” (WEF, 2025, p. 6). Employees want to go to work and feel satisfied and like their work matters. Workforce readiness and skill confidence may be a significant contributor to employee engagement. However, the opposite may be true when skill sets do not match the needs of an organization. A recent survey on workplace experience finds that employee engagement fell to 20% in 2025, costing an estimated $10 trillion in lost productivity to the world’s economy (Gallup, 2026).

Adolescents are feeling the effects of the decline in workforce readiness, confidence, and engagement. According

to the U.S. Centers for Disease Control and Prevention, 40% of students had persistent feelings of sadness or hopelessness, 20% of students seriously considered attempting suicide, and 9% attempted suicide in 2023 (Centers for Disease Control and Prevention. (2024). Globally, one in seven adolescents experience illness- and disability-causing mental disorders such as depression and anxiety, and suicide is the third leading cause of death among 15–29-year-olds (World Health Organization [WHO], 2025). Kessler et al. (2005) reports that half of all lifetime cases of DSM-IV disorders start by age 14, and three-fourths of all disorders start by 24 years old. Addressing (or not addressing) the current adolescent concern will affect the world's youth and their indefinite future. Based on the current trends, upcoming generations will also benefit from a global intervention to the aforementioned problems or suffer from the inability to implement effective changes.

This paper posits that adolescents are experiencing a habit gap, or the absence of automatic, foundational habits, including critical thinking, communication, metacognition, and organization, required for adult independence and confidence. Despite educational knowledge and developed technical skills, they lack the automated, context-triggered healthy behaviors that support independence. Closing this gap supports three outcomes essential to thriving: workforce readiness, relationships, and lasting positive habits. Studies such as the Harvard Study of Adult Development (Waldinger & Schulz, 2023), the Blue Zones studies (Buettner & Skemp, 2016; Nair & Collins, 2022), and systematic reviews (Folk & Dunn, 2023; Wilkie et al., 2026) indicate lifelong happiness stems from early habit development and intergenerational connection. Further studies indicate that habits can require only two to five months to develop (Singh et al., 2024), and decades of psychological research indicate that habits can be formed through associative learning with a consistent context cue over a period of time (Gardner et al., 2012). To address the adolescent habit gap, it is vital to help teens create lasting intergenerational connections and develop the very habits needed for personal confidence and workforce readiness.

The Foundation and the Framework: Overcoming the Adolescent Habit Gap

The Foundation: Intergenerational Connection

Data was examined from the National Longitudinal Study of Adolescent to Adult Health (Add Health) to examine disconnected seventh-twelfth graders. "About 15 percent of young people in middle and high school (ages 11 to 18) become *disconnected*—that is, not engaging in school, training, or work—by ages 18 to 24" (Bonds & Wenger, 2025). According to Nica (2025), there has been an increase in adult child estrangement from their parents in recent years. Estrangement can be caused by loss of affection, conflict, or other relational concepts such as "lack of emotional intimacy, an unsatisfactory relationship, and a belief that there is no way to resolve problems" (Agllias, 2018, p. 108).

Challenges between adults and teenagers have been a significant source of contemplation and discourse. A parent and their child must adapt to each other throughout the child's years of growing up. The parent has never experienced raising the specific child before, and the child has never experienced reality in the given space and time they are being raised in. This proves challenging, as, even if the parent has raised another child, the time, personality characteristics, and other factors contribute to creating complexity for each unique parent/child experience. Therefore, no matter what parenting book is read, worksheet completed, or previous success tried

with a sibling, there are no guarantees that attempts of a planned parenting strategy will succeed.

However, the beneficial impact of intergenerational connection has been extensively researched, documented, and discussed. For example, the Harvard Study of Adult Development (Waldinger & Schulz, 2023), has inspired books, papers, podcasts, and a TED Talk (Harvard Study of Adult Development, n.d.). Throughout the 8+ decades-long study, the psychiatrist and psychologist authors and researchers conclude from the data that, “good relationships keep [humans] happier, healthier, and help us live longer” (p. 278). Relationships that bridge generations, such as grandparents, mentors, and parents of peers sustain a level of emotional intimacy and curiosity. As teenagers develop towards adulthood, it is biologically appropriate for them to seek autonomy from their guardians, challenge authority, and display adaptive behaviors as they strive to become more independent (Jager et al., 2014). Therefore, having established relationships with trusted adults prior to this transition benefits both parents and teens.

While strong relationships support young adults as they transition during the biologically complex, transitional time as they bridge towards independence, the lack of strong social relationships influences mortality and overall health (Holt-Lunstad et al., 2010). Current evidence suggests that the quality and quantity of social relationships in industrialized countries are being reduced. As adolescents leave familial homes for college, they lose connections with friends and family. Young adults are delaying getting married and having children. With ease of access and increased technological capabilities, reliance on human friendships has become less prevalent than in history (Bonds & Wenger, 2025). Bonds and Wenger (2025) expand upon the predictive nature of the early habit gap: “Even in the years before disconnection emerges, youth who eventually become disconnected are different from their connected peers across several dimensions. They are more likely to report symptoms of depression, experience an early pregnancy, use substances, engage in delinquent activities, have weaker social support structures, and be suspended from school” (Bonds & Wenger, 2025, The Path Forward section, para. 1). Furthermore, Cacioppo and Cacioppo (2014) produce evidence that lonely adults have a variety of extreme mental, emotional, and physical ailments that have a significant impact on life satisfaction and overall wellbeing.

However, in a meta-analytic review across 148 studies with over 300,000 participants, Holt-Lunstad et al. also note that strong social relationships had a significantly positive effect: “The overall effect size corresponds with a 50% increase in odds of survival as a function of social relationships. Multidimensional assessments of social integration yielded an even stronger association: a 91% increase in odds of survival” (Holt-Lunstad et al., 2010, p. 9). Bonds & Wenger suggest "Strong social ties have been linked to better adult outcomes, including educational attainment, labor market attachment, and psychological well-being... Consistent with the literature, higher social support during high school is correlated with a reduction in disconnection in early adulthood" (2025). Centenarian studies, such as the Blue Zone studies, confirm that communities across the globe consistently have the longest-living and most gregarious people, and identify lifestyle characteristics that include intergenerational connection. There is multi-generational housing, great-grandparents look forward to caring for their youngest family members, and community gatherings are common (Austad & Pes, 2025; Buettner & Skemp, 2016). Adolescents need connection, support, and a sense of community. They need to feel like they belong, especially during the transitional time when it is biologically natural for them to begin to separate from their guardians and question

authority.

The Framework: Early Habit Formation

Centenarian studies indicate connection as an important part of longevity and life satisfaction, but healthy habits are another top component of daily life (Buettner & Skemp, 2016). Without early positive habit formation, adults form negative habits that are detrimental to health and wellbeing causing increased disease, obesity, and mental health disorders. Outside of the Blue Zones and an increasing minority, the lack of building positive habits when today's adults were in their youth is costly: 72% of Americans report having one or more unhealthy habits (smoking, physical inactivity, excessive drinking, obesity, and insufficient sleep) (United Health Foundation, n.d.). Espinosa-Salas and Gonzalez-Arias (2023) estimate that unhealthy behaviors were directly responsible for more than 23 million deaths and 36.5% of disability-adjusted life-years in 2017 alone. While adults understand and desire to stop unhealthy behaviors and start healthy behaviors, there is a significant "intention-behavior gap," as changing these behaviors in adulthood takes significant dedication, support, and often medication (Espinosa-Salas & Gonzalez-Arias, 2023). Each January in the United States, gyms, weight-loss clinics, and running clubs see a new vigor of activity with "New Years Resolutions" that comedians joke last only a week. Establishing strong and positive habits in childhood would benefit our youth for a lifetime, reducing disease, disabilities, and death.

A meta-analysis of 20 studies involving 2601 participants indicated that habits could take two months or more to establish, but it varies by individuals (Singh et al., 2024). They report, "Four studies reported the median or mean times to reach habit formation, ranging from 59-66 days (median)" (Abstract). Another study indicated that "the median time to reach 95% of asymptote was 66 days" (Lally et al., 2010). In twelve studies, three stages of habit development were reported as positive determinants in twelve studies: (1) making a decision and turning it into action, (2) consistently repeating the behavior with context stability, and (3) developing automaticity by enjoying the behavior and purposefully planning the details (Singh et al., 2024, pp. 8–9). While the evidence indicates that habit development is highly individualized and the variation in how long it may take to develop automaticity, consistent studies show a significant amount of participants can form positive habits within a few weeks. Each of these studies included habits that would benefit participants, including drinking more water, exercising, or eating healthy foods. Adolescent habit development through habit-building activities would present lifelong benefits to each individual successfully completing such a program or course.

Automaticity is also dependent on an association with an already-established cue. Substantial research and numerous books have been distributed with innumerable stories of people pairing a newly desired habit to an established one (Clear, 2018; Gardner et al., 2012; Lally et al., 2010). For example, if someone wanted to create a new habit of hanging their keys on a hook instead of losing keys around the house, they might use shutting the front door as their already-established contextual cue and then pair hanging their keys directly after shutting the door. While this might take one individual a few days to automate, another may need months. But according to Gardner et al., multiple studies indicate habit-formation principles have a positive impact and lead to weight loss and other health-promoting behaviors. The authors propose healthy habits are created by (1) deciding on a goal,

(2) choosing a simple daily action, and (3) planning and consistently completing the action. They also suggest using a checklist or "tick-sheet" (2010). Small actions and consistency lead to habit automation and significant results.

Adolescents increasing time outside, eating healthy food, hydrating, walking or engaging in other movement, and other healthy habits can increase self-efficacy, suggests Gardner et al (2012). Feeling fitter, eating healthier, and drinking more water can lead to better sleep and overall health, affecting presence and confidence. Adolescents and adults are experiencing significant feelings of loneliness and other mental health challenges (CDC, 2024; Making Caring Common, 2024). Instead of young people sitting at desks learning theory or listening to lectures on what they should be doing, adults of all ages can mentor adolescents by helping establish healthy routines. By combining an intergenerational connection with a new healthy habit, both an adult and an adolescent can build lifelong practices, including connection. Most importantly, adolescence is the optimal time for lifelong habit development, including healthy habits and workforce readiness skills.

Construct Reasoning: Why the Foundation and the Framework Bridges the Gap

Self-Determination Theory (Ryan & Deci, 2000*)*

Adolescents are innately curious and interested in learning and developing knowledge, especially as they pursue adult independence. A "large corpus of empirical evidence" based on self-determination theory (SDT) research, young people thrive on intrinsic and autonomous extrinsic motivation while inspiring autonomy and self-regulation (Niemiec & Ryan, 2009). However, adolescents are consistently experiencing close supervision, explicit external controls, and evaluations paired with rewards and punishments. Niemiec and Ryan (2009) state, "Under these controlling conditions, however, the feelings of joy, enthusiasm, and interest that once accompanied learning are frequently replaced by experiences of anxiety, boredom, or alienation" (p. 134). Intrinsic motivation for learning requires both autonomy and competence, or both the feeling that the learner can accomplish the learning by themselves and with a sense of satisfaction. When young people learn out of curiosity or for a purpose such as teaching the concept to peers, conceptual learning increases compared with learning for an assignment or test (p. 135).

Niemiec and Ryan (2009) further expand on the impact of autonomous self-regulation for learning. Examples include, identified regulation, or learning for future competence and autonomy, and integrated regulation, or learning for a future outcome that will synthesize with self-identity (pp. 137-138). When adolescents can not only answer the questions, "what am I learning?" "why am I learning this?" and "how am I learning this?" but also have a personal investment in the outcome of their learning, they are effective learners at all academic levels and abilities. When intrinsic motivation is high, this accelerates learning due to self-regulation which pairs with higher well-being (vitality, life satisfaction) and lower ill-being (depression, externalizing problems) (p. 138).

When students of all ages, but specifically adolescents, learn about concepts that relate directly to their personal lives, families, strengths, and financial futures, it is their natural tendency to take interest and become intrinsically motivated to engage. If the material is for personal application as opposed to being tested for reward or

punishment, students are allowed to come at learning with curiosity, open-ended questions, and can individualize learning, making the impact meaningful.

Adolescent Development (Pickhardt, 2013)

During adolescent development, one of the most significant parental or guardianship challenges is balancing the numerous roles required as they guide their child. As the teenager develops the skills needed to become fully independent, the parent will transfer responsibilities, teach adult communication and emotional regulation skills, maintain manageable expectations, and tolerate increased distance, differences, and discord as more independence is established between them (Pickhardt, 2013, p. xvii). Pickhardt teaches that experimentation, curiosity, and a desire for new freedoms are critical for adolescent development and come in waves. These patterns are normal for development, and as teenagers age closer to maturity, they need to create the mental and psychological dynamics to leave home and live on their own.

Pickhardt suggests five adjustments to expect during this process. Adolescents will inadequately inform, be less compatible, be less companionable, allow less influence, and engage in more conflict (p. 16). When parents, guardians, and mentors meet adolescents with appropriate expectations, allow for exploration of independence and curiosity, and enable them to explore through opportunities for individualized, scaffolded autonomy, teenagers can have appropriate means to explore their desired freedoms while establishing age-appropriate distance. If these opportunities can be paired with positive habits and/or supportive connections, adolescents will feel supported in their natural biological tendencies while establishing lifelong behaviors. New freedoms and connections, while building positive habits, can come in the form of a new community volunteer role or program, purchasing or finding a new habit-building program, or allowing the teen to take on more responsibilities around the home, especially if they can accomplish the tasks or design independently and differently than traditionally accomplished.

Neurodivergent-Informed Design

Adolescents face numerous challenges, but some face more than others. Students can face traditional developmental complexities but can also be hindered by further compounding factors such as attention deficit hyperactivity disorder, obsessive compulsive disorder, autism, dyslexia, dysgraphia, and more. Currently, estimates vary regarding how many of these neurodivergent learners currently populate the planet. Some estimate there are between 5% and 30% in higher education (Gray et al., 2025) while Doyle (2020) projects that 15-20% of adults, globally, are neurodiverse (p. 112). Gray et al. (2025) found that neurodivergent students were “expected to conform to learning environments that exclude them and do not support their learning.” Many learners struggle with a complex range of abilities from writing and reading, time management and concentration, memory and spatial awareness, and processing speed and communication (Doyle, 2020). The authors suggest, “Despite growing awareness of neurodivergence, neurodivergent students still struggle (p. 1037).”

Multiple studies, educational manuals, and theses support “neurodivergent students have distinct capabilities and

can thrive given appropriate social, physical and structural environments, and educators and students will benefit from recognizing, celebrating and supporting this complexity" (Gray et al., 2025, p. 1045). Scaffolding neurodiverse learners with technology adaptations, context cues, and other support structures can allow them to flourish (Singer, 2017). When learners are taught to consider their neurodiversity characteristics as a potential talent, they can harness tools like hyper-focusing or a mechanical inclination (Armstrong, 2012).

One form of scaffolding for neurodiverse learners, called "universal design", has been studied and implemented for well over a decade (Armstrong, 2012). Universal design differentiated instruction supports learners with learning barriers but also supports all learners. Armstrong restates the example given to educators across disciplines of a curb cut on a street, designed for people who are blind and in wheelchairs, while benefitting joggers, bikers, and parents pushing strollers. Cognitively, breaking long assignments into sections with checkboxes, adding visuals and sound context cues, and adapting learning for collaboration are all universal design for learning strategies that not only benefit neurodiverse learners but all learners.

Armstrong recognizes Rose & Meyer's 2002 Universal Design for Learning primary brain networks: (1) recognition networks (or "what am I learning?"), (2) strategic networks (or "how am I learning?"), (3) and affective networks or ("why am I learning?") (2012, p. 18). When both neurodiverse and neurotypical learners can work through these questions as they learn, they engage in ways they previously disconnected from, especially as they take ownership of their learning process. Combining student-centered questions such as these with micro-learning checkboxes, universal designed considerations like audio and visual context clues, and repetitive pacing paired with a consistent cue, students of all abilities automate their learning into lifelong habits.

From Theory to Practice: A Design Case

Habit formation literature is greatly theoretical, promoting adding healthy habits or stopping unhealthy behaviors. A need is clear for a systematic and actionable framework to support habit development, intergenerational connection, with skills translatable to workforce readiness. Be Where You Are LLC is an educational technology startup founded to address the critical gap in the preparation of teen life habit development. Jobsperience™ was a program created to deliver actionable micro-activities over 105 days in seven minutes or less a day. The design was built to foster connections among intergenerational family members while building habits such as organization, communication, and financial decision making.

Design Principles

The 15 week, 105-day design is based on multiple studies suggesting habits take weeks to automate (Lally et al., 2010; Singh et al., 2024). The 7-minute-or-less-a-day time commitment is based on research that suggests that small changes support habit development, and "Actions that were initially difficult to stick to became easier to maintain" (Gardner et al., 2012, p. 664). The program is delivered directly to family members' individual calendars, promoting autonomy and individual application based on individualized contextual cues. Individualized learning and experimentation are supported by adolescent development models (Pickhardt, 2013),

neurodivergent-informed learning and universal design theory (Armstrong, 2012), and self-determination theory (Niemiec & Ryan, 2009).

Each participant views a single line at the top of their calendar that states the day of the habit and the title of the day's focus. For example, in the "Organization for Adult Independence" program, day one gives simple, actionable instructions by stating, "Day 1, Organization: Open Your Calendar." During the subsequent 104 days, participants continue to open their calendar and build skills such as adding events, color-coding events, adding locations, inviting guests, linking webpages and documents, and more. Participants build the habit of opening their calendar and making an event every day while learning a skill transferable to the workforce and helpful in building connections and maintaining communication with communities of various contexts. Parents, guardians, or teachers do not lecture but participate asynchronously, preserving teen autonomy and promoting connection through parallel experiences.

The Co-Design Process

The co-creators of the habit-building program are a mother and son team. While the significant author is Tara Lynn Haley, an educator with over 20 years of experience who specializes in working with at-risk youth and neurodivergent learners, Liam John Haley contributed significantly to pacing, structure, and design elements. Ms. Haley has been clinically diagnosed with attention deficit hyperactivity disorder, repetitive thought obsessive compulsive disorder, and complex post-traumatic stress disorder, highlighting her understanding of neurodivergent learners. Mr. Haley was assessed in public education and placed in a specialized learning program for gifted learners. He has a different perspective that has helped while considering a habit-building program for all learners. While both designers understand neurodivergent perspectives from different design principles, they worked in tandem to create meaningful experiences to answer the three questions that empower both neurodivergent and neurotypical learners within the program's structure: (1) What am I learning? (2) How am I learning?, and (3) Why am I learning? (Armstrong, 2012, p. 18).

Initial product research and curriculum was developed over summer months when the co-creators were not in school session. Over the last 5 years, elements of the habit-formation structure were implemented in Ms. Haley's classroom with both high school students and dual-credit high school/college students. Students offered qualitative feedback through anonymous Google Forms to inform creators of the adolescent experience. No student data or confidential information was retained.

The 105-Day Structure

During the 105-day habit-forming arc, the main habit is maintained, paired with the context cue. For example, the product's calendar organization program suggests pairing opening the participant's calendar after waking up, brushing their teeth, sitting down in advisory class or at their workstation, or having their morning breakfast. During week one, the stakes are low-stress and invite curiosity, asking the participants to click around their calendars and consider how the tools might help them as they become independent adults. This strategy initiates

autonomous self-regulation for learning (Niemiec & Ryan, 2009) that helps adolescents consider future identity and projected self-benefit, which assists in self-motivation. During progressive weeks, participants slowly add to habit developments, gaining confidence while building significant and applicable adult skills. After 15 weeks, participants have spent 105 days opening their calendars and creating events with variations, using skills that will help them when they make their next doctor or dentist appointments, schedule their next team-building activity, or set a reminder for their future job interview.

Discussion

Implications for Practice

Parents, homeschooling educators, mentors, and educators across contexts can apply these principles to their application. No matter the venue, adults and adolescents are statistically struggling (CDC, 2024; Making Caring Common, 2024) yet studies show that intergenerational connection has positive benefits for health and life longevity (Waldinger & Schulz, 2023; Buettner & Skemp, 2016). Kessler et al. (2005) reports that half of all lifetime cases of DSM-IV disorders start by age 14, and three-fourths of all disorders start by 24 years old. Yet positive lifetime habits can also begin during adolescence, and especially paired with intergenerational connections, can create accountability and structure.

Using research on habit formation, universal design for learning, and self-determination theory, asynchronous learning through contextual cues and multiple-week consistent repetition helps adolescents gain confidence by creating positive habits. These habits, such as organization, communication, budgeting, and time management, not only help with workforce readiness but also help with household responsibilities, educational responsibilities, and foster connection through conversations when adults practice the habits together. This creates an environment where adolescents view their parent, guardian, educator, or mentor as a partner instead of someone who is in an authoritative position, lessening the biological need for teens to distance themselves from authority (Pickhardt, 2013). Instead, collaborative measures build connections.

Implications for Research

The second edition of the product's calendar organization program was published in February 2026. There is a need for a formal IRB-approved efficacy trial. A formal IRB-approved study has not been completed with both adolescent participants and their parents or guardians. A significant gap in the literature exists until this trial can be completed and analyzed. However, this trial is scheduled for 2026 with a second-edition model of the program, created after extensive testing and input.

Limitations and Future Directions

During the development of the first edition of Jobsperience™ Calendar Organization for Adult Independence, informal formative feedback was gathered from 37 families (N=77 respondents) via Google Forms. This feedback was used to inform design instructions and was not collected as formal research. It was not subject to Institutional

Review Board (IRB) review.

Self-reported responses indicated 100% satisfaction and 98.7% self-reported habit improvement during a 15-week implementation period. This data was collected to inform design and not as evidence of formal research. However, a formally designed, IRB-approved pilot study of the second-edition curriculum is planned to assess effectiveness.

Other limitations include the small sample size, self-reporting data, and a lack of a control group. During further research, both quantitative and qualitative data will be acquired. The authors were both designers and evaluators; designer bias may affect the study.

Conclusion

Adolescents are persistently sad, lonely (Centers for Disease Control and Prevention, 2024), and struggling in school (NCES, 2024), and half of all disorders start by age 14 (Kessler et al., 2005). When adolescents are struggling, parents, guardians, and educators often use control and restriction as their adolescents create conflict as they move towards independence, creating anxiety, boredom, and depression (Niemiec & Ryan, 2009). However, connection has positive benefits for health and life longevity (Waldinger & Schulz, 2023; Buettner & Skemp, 2016). Habit automation varies by individuals with many developing over several weeks (Clear, 2018; Gardner et al., 2012; Lally et al., 2010; Singh et al., 2024). Positive habits such as healthy eating, drinking, activity, and social connection habits have lifelong benefits (Buettner & Skemp, 2016). Intergenerational micro-learning is designed to have positive benefits by providing structured guidance for both the adult and the adolescent. Each participant can use their own daily context cue to maintain autonomy and experiment with individualizing the habit while fostering connection during discussion. This approach aligns with research that suggests positive habit development may help adolescents automate behaviors that will help them build relationships, confidence, and workforce readiness skills.

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Studying Architecture Through the Lens of the Archive

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Abstract

University archives regularly collect architectural documents, and in Fall 2025 the Rochester Institute of Technology (RIT) received the complete collection of a local architect, Martha Gates, known for designing houses using passive solar techniques that heat and cool buildings without electricity. Following contact from the RIT archivist about classroom use of this material, a project was developed for a first-year Graduate Architecture Studio with two goals: enabling students to learn passive solar design principles through the archive, and producing documentation identifying which parts of the collection were most instructive. Students engaged the archival materials in two ways: first, by studying a drawing of the architect's typical building section and constructing a model of the passive construction technique; second, by visiting the archive to select a passive solar precedent from the Martha M. Gates records, which informed their design of a residential project for visiting scholars on a museum campus. The resulting projects and models demonstrated a clear connection between archival research and deeper design understanding, and also serve as teaching tools for non-architectural professionals by translating archival documentation into visual and physical examples. These works will be displayed alongside original archival materials to increase public and institutional engagement with the archive.

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Introduction

Archival research rarely converges with the work done in design studios: architecture studios teach building design, whereas archives preserve and disseminate historical materials. However, an active archive drives the memory of an institution, a professor, a place, or a person. The archive is not just a repository of knowledge, but also a curator of importance. Choosing which items to keep and which to publicize becomes an active process of making history. By linking an archive with a design studio, it is possible to develop an active relationship with history. For example, in the first-year, second-semester Graduate Architecture Studio, "Design II," we used the Rochester Institute of Technology (RIT) Archives to learn about passive design techniques in wood-frame buildings. The RIT Archives had just received the documents of an architect, Martha M. Gates, who was known in the 1970s and 1980s for construction techniques that allowed buildings to naturally absorb heat from the sun, called passive solar. The students built a model of her teaching documents and used this technique to design their own housing units, which were then collected by the archivist and added to the collection. This collaboration transforms the archive by learning from archival drawings and then archiving the process of learning.

Traditionally, the archive has been thought of as a stationary repository of objects—contemporary ideas about archiving challenge this narrative. According to Albena Yaneva's 2020 book *Crafting History: Archiving and the Quest for Architectural Legacy*, "The active modality of engagement with objects does not occur in an institution that passively holds archives; rather, it is the archiving moves that sustain the institution" (p. 190). Further, "The knowledge gained in archiving does not derive from the superimposition of a visual and a built world, but from the constantly expanding network of archiving, and the larger network of collecting institutions" (Yaneva, Albena, 2020, p. 191).

In other words, archives are locations that preserve creations to develop a historical continuum of local knowledge. Archives not only collect and store historical information; they actively create more content based on their collections. The RIT Archives, for example, encourage engagement with the material in ways that they can also document. Thus, the archive grows not only in relation to its original primary sources but also in newly created content based on these originals. This project is one example of this continuous loop of documentation.

Martha M. Gates Architectural Archive

Archives often preserve the voices of the past that may have been stifled by the dominant contemporary culture, a case that applies to women architects in the mid-twentieth century. Our archive recently acquired the architectural documentation of a lifetime of work by a local architect, Margaret M. Gates (1914–2004), who graduated from Cambridge Graduate architectural school in 1939 and practiced from 1959 through the mid-1990s. In 1975, she discovered the work of Paolo Solari and visited Arco Santi as part of a trip to visit her daughter in New Mexico. This seminal trip changed her career focus to the application of passive solar in residential design. From then on, she became active not only in incorporating passive solar into her designs but also in teaching these techniques to the public to encourage demand for energy-efficient homes (V. Searl, interview with the author, September 26, 2025).

Her story is also a family story, since she employed and collaborated with her daughter, Virginia Gates Searl, who also became an architect. Virginia took a position at a firm focused on historic preservation in 1994 when Martha retired and closed her office. Virginia continued working in the field of historic preservation architecture until 2019, and she and a coworker purchased the firm from its founder in 2008 when he retired. The firm, Bero Architecture, has been a woman-owned business since then, attracting women as both architects and interns. Today, this firm remains active in preservation and in promoting women architects in the Rochester region.

The architecture department at RIT has close ties to many of the architectural firms in the area, including Bero Architecture. Their architects have critiqued our students' final projects. Our department encourages local participation in the education of our students. In return, these local firms often employ our students after graduation. We were thrilled to find out that the Gates collection was being donated to RIT and that it was available for personal research and accessible to the student body. The acquisition of the Gates documents led to the first time the RIT Archives approached the Architecture department to collaborate.

Our university archive has an extremely robust exhibition program, partnering with faculty across campus to integrate archival materials into the classroom. It also created an opportunity for collaboration among the RIT Archives, the Museum Studies department, Graphic Design, and the Architecture department. Museum Studies and Graphic Design were asked to curate and design an exhibit with the existing documentation. Since this newly acquired collection primarily consists of working documents, there was very little existing explanation of Gates's use of passive solar or her pioneering importance to women architects. The archive has provided the Architecture department with a great opportunity to collaborate on developing that explanation together.

We decided to bring these ideas together through the first-year, second-semester Graduate Architecture Studio. This studio traditionally focuses on both residential design and wood construction. By using Gates's work as a jumping-off point, the studio could cover residential design, wood construction, passive solar technology, and archival research.

Methodology

Process of Learning from the Archive in an Architectural Studio

According to the lesson plan, students begin by studying Gates's passive solar houses. They each research and present one specific technique Gates used in her houses, including a south-facing sunroom, a multiflue chimney, a Trombe wall, and offset studs that provide additional insulation. This approach provides students with the background to begin the second research-based project in the studio. The archive acquired the original building section that Gates used in local seminars to teach about passive solar technology. The students each reproduced this building section to scale in model form.

The architectural project comprises the design of a 1,000–1,500-square-foot house based on the wall section. The building will also include the passive solar technique that the students learned from Gates's work, making it a physical model project requiring multiple iterations. For the initial iteration of this studio, Virginia Searl agreed

to be involved as a design critic for both projects. We also planned to have her former firm criticize the final residential design project and to have a local architect join the studio to discuss the role of women in sustainable architecture today.

The students in the studio work alongside Museum Studies and Graphic Design students on a year-long exhibit spanning the entire third floor of our academic library. This exhibit celebrates the archive's collection of twentieth-century Rochester architecture, reminding us that "archival institutions are reminiscent of accelerators: they renegotiate and redistribute objects' proprieties and thus amplify and prepare the ground for the capitalization of architectural knowledge" (Yaneva, Albena, 2020, p. 191). Both the original archival material and the new student work will be displayed and retained by the archive.

This project combines several unique but important aspects of archiving architectural documents through the studio experience. First, it gives students the opportunity to collaborate with the Museum Studies department in a unique way. The back-and-forth of the projects—archive to design, design to display—should create a rich discussion about the importance of the archive in keeping local history alive. The historical data in this example is both architectural knowledge and the contributions of a woman architect. As Yaneva, Albena (2020) wrote, "Far from being an isolated fortress, a collecting institution is rather a node in the large network of architectural knowledge production. Not a temple, but a regulator of flows and trends, bending space and time around it, an accelerator, a transformer" (p. 192). Second, this project envisions the archive as a transformative space and actively adds to the archive material. Through this studio collaboration with the archive and the architect, we strive to illuminate the growing acceptance of women in architecture and the importance of teaching passive solar technology.

The outcomes envisioned for this project are both educational and archival. First, the objectives of this studio focus on learning typical construction practices in the design of residential architecture. Martha Gates's career focused on wood-construction housing and passive homes, and one of her designs won the New York State Energy Research and Development Authority's Passive Solar Design and Building Competition in 1979. Therefore, her design techniques connected well with the educational goals of this class. I added the use of basic passive solar techniques into the Spring 2026 class; however, it has not typically been taught in this particular course. The archive's goals were to learn how to use, interpret, and explain the significance of a collection predominantly composed of architectural drawings. According to Landyn Hatch, the Innovation and Engagement Archivist at RIT, few archives discuss architectural documentation, so many archivists are unsure of how to encourage people to use these types of collections. The goal was to use the architectural studio to tease out several ways not only to use but also to add to the collection. Together, we developed a proposal where the students interpret the drawings through both model building and design.

Results

The Studio Project

The first-year, second-semester Graduate Architecture Studio, "Design II," focuses on both residential design and

wood construction. The objectives for this studio are to synthesize design fundamentals with comprehensive residential design, and the course materials cover spatiality, materiality, structure, construction, use, context, aesthetics, zoning, codes, and cultural conditions. It also requires exploring alternative wood structural systems to evaluate their impact on architectural design. The studio is coupled with a technical course, “Fundamentals of Building Systems,” which simultaneously teaches the creation of building sections and the basics of wood construction.

Traditionally, student assignments in the studio included cabins, single-family residential, and multifamily residential in a rural or suburban context. For this project, I used the Genesee Country Village and Museum (GCVM), which is the largest living museum in New York State. It is within twenty-five miles of campus, so the students were able to visit the site. The benefit of using the museum was both access to the site and openness to exploratory design.

Of the three studio projects, the second was a residence built using wood construction. It was the best fit for learning from the archival documents. The students were to design a duplex housing complex for visiting scholars on the GCVM campus: one side of the duplex would be a one-bedroom or studio unit with an office area; the other side would have two bedrooms or a family room, also including an office area. The project required knowledge of wood construction, but it also allowed for creative nontraditional solutions.

Building Section to Sectional Model

The first question was how to teach wood construction using the material available in the archive. Architect Martha Gates focused not only on using passive construction but also on passive techniques. The Gates collection included a building section -a drawing of a vertical cut through a wall- that she used to teach these techniques. A section is the most important drawing for communicating building construction, and this particular example addresses both wall construction and the improvements that will make the structure as a whole more energy efficient.

Because one objective of the second-semester sequence is to teach students about wall sections, this document was a wonderful opportunity for the students to learn how to read and interpret its distinct parts. For example, I asked the students to build a scale model of this wall section, label each part, and explain the unique areas that make the section appropriate for passive solar applications. The models were approximately three feet high and included the wood construction, glazing, and insulation. The students learned that this construction creates walls that are twice as insulated and four inches thicker than standard wood stick construction. They were then tasked with using this wall construction for their designs and drawing the appropriate wall thickness on their floor plans and sections.

The content summarized as Architectural wall section and student models is presented in Figure 1.

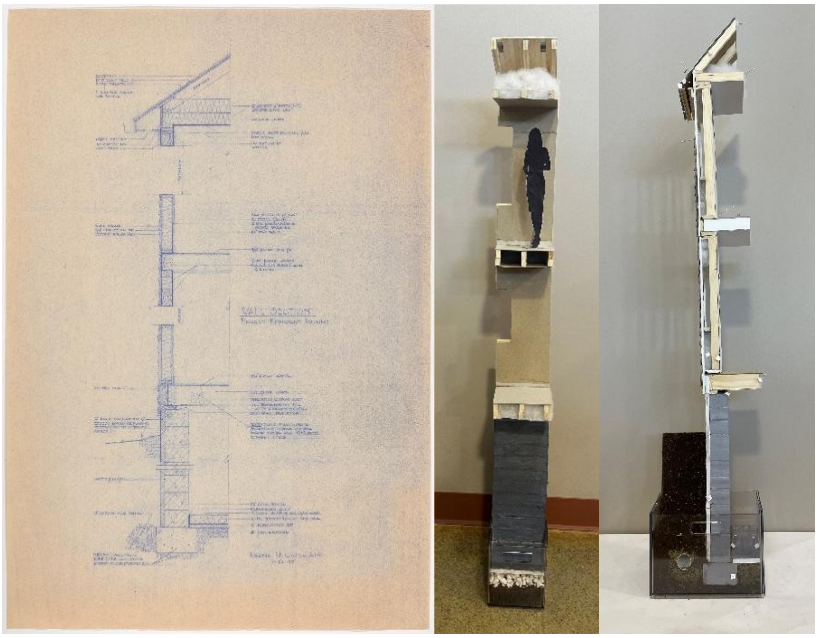


Figure 1. Architectural Wall Section and Student Models

Building section by architect Martha Gates and models of sections by students. Photograph credits: RIT Archives (left); students Hannah Owens, Rachael Duggan, Sam Palmer, and Isabella Petito (right).

Visiting the Archives

The RIT Archives store institutional collections on the history of the institute; Deaf culture and history; artwork by RIT alumni, faculty, and students; and other special collections. These special collections generally center on the connection between RIT and the local Rochester community The Gates collection comprises a series of architectural documents on many of Gates's architectural projects. Most of these projects are residential, and each residence in the archive has most of the construction documents for that house. This provides an excellent opportunity for students to learn to read architectural documents and apply this knowledge to their own projects.

The "Design II" studio focuses on residential design. We require them to learn wood structural systems and how to design housing using them. Thus, after completing the wall section model, the students began designing their own residences. In the second week of design, the class visited the archives, which gave students direct access to Gates's original documents. They also learned how to handle archival materials and the importance of maintaining the collection.

The content summarized as Students visiting the RIT archive is presented in Figure 2. In architectural studios, students typically search for precedents online, in architectural journals, and in books. We used the archive instead. More specifically, the students were tasked with identifying in the architectural documents other techniques Gates used to apply passive design. Each student found specific methods Gates used that they would like to apply or that were similar to ideas they had for their own designs. The archive helped tremendously by providing the students with digital copies of the drawings they selected, which allowed them to study these techniques in more depth later.



Figure 2. Students Visiting the RIT Archive

Students Rachael Duggan, Isabella Petito, and Hannah Owens visiting the RIT archive with Landyn Hatch and Ella Von Holtum in Spring 2026. Photograph credit: author.

The content summarized as Students visiting the RIT Archives is presented in Figure 3.



Figure 3. Students Visiting the RIT Archives

Students Rachael Duggan, Isabella Petito, and Hannah Owens visiting the RIT Archives in Spring 2026. Photograph credit: author.

Passive Solar Precedent in Design

As their second full architectural design studio, the students were still learning the basics of the design process. Consequently, I relied on model building and diagramming: the diagrams simplify design ideas in graphic form, similar to an outline. For example, building orientation is based on the site, topography, sun, and circulation. Model building remains the closest representation of actual building structures. It requires the structure to hold together under gravity (unlike computer modeling) and allows the student to see the building in three-dimensional form.

When the students returned from the RIT Archives, they began developing their residential designs through model building and diagramming, and produced several series of study models and drawings. These were then translated into floor plans, sections, and elevations. Each of these designs used the larger wall dimensions learned in the original wall section model. Students also indicated which passive technique they selected from visiting the Gates records at the RIT Archives.

The content summarized as Student using the Heliodon for daylight is presented in Figure 4.

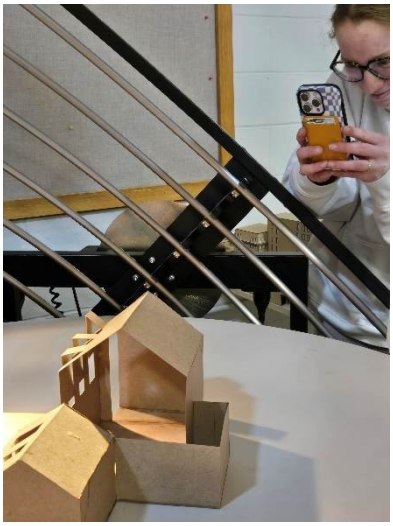


Figure 4. Student Using the Heliodon for Daylight

Student Hannah Owens working with the Heliodon to verify how the building responds to daylight. Photograph credit: author.

Archiving Engagement

The final presentation included a well-crafted scale model of their designs along with posters illustrating the importance of what they learned from the Gates collection. In my initial contact with the RIT Archives, the archivists were extremely excited about the collection but were seeking help in translating this series of architectural documents for the public. We agreed that my studio would also provide a way to interpret and explain Gates's architectural approach. Then, our final products would be exhibited in the archives' public gallery alongside some of the drawings in the Gates collection. The students' building section models, along with posters

explaining passive solar, would serve as the centerpiece of this exhibition. The exhibition would also include their design models and posters on how they utilized the materials from the archive to learn about Gates's passive solar techniques. Consequently, the archive then became an active space for both learning about the collection and adding to its knowledge.

Discussion

Faculty Response

Overall, this project successfully met the course objectives. The students increased their knowledge of wood construction and residential design. They also became more proficient in using diagrams and study models as design tools. In the final design critique, students were able to communicate their design intent to the guest critics both verbally and graphically. Most importantly for this study, the students were able to field questions on the basics of passive solar. The students understood where their explorations could go forward into a more complete study of passive solar. They also learned that Martha Gates was thinking decades before her time. The 2026 New York State Residential Energy Code finally requires that typical wood frame construction meet the high energy standards of Gates's building section, which the students built. Therefore, this approach to the Design II studio not only taught students the basics of design, but they also learned that, by researching construction types through the archive resources, they could actively participate in the future of ecological design, just as Gates did.

Student Response

The students enjoyed the unconventional nature of using the archive and designing primarily through models. They had not been exposed to building sections before this studio, so the students spent time not just building but researching the different aspects of Gates's wall section. They then had to decide which scale would be easier to build and would convey the most information to non-architects. One student stated, "Serving as part 1 of our project, creating a scale model of her wall allowed me to understand the components of a wall and what exactly Martha [Gates] did to set herself apart." This exploration of building components mirrors working in an architectural office, where research is integral to the design process. Another student added, "You can look at all of the diagrams in the world, but a diagram will never be the same as modeling firsthand." The physical experience of modeling was an impactful learning tool.

The students in the studio also expressed the importance of their learning through the archive itself. According to one student:

From going to the archives and diving into Martha Gates's life's work, I learned how to efficiently structure a house so that life inside would be more purposeful in relation to the access of natural elements outside the house. In short, I learned how to be very intentional with design decisions.

Another student stated what she learned as follows:

Martha Gates carefully studies each site to align her buildings with natural wind patterns and solar movement. She positions openings to capture prevailing summer breezes for cross-ventilation while using the building's form to block harsh winter winds. By orienting primary spaces toward southern exposure, she maximizes low winter sun for passive heating and reduces energy demand year-round.

These site ideas are fundamental to passive design. This student was able to use Gates's drawing analysis in her own analysis of the building site. A third student said:

When it came time to visit the archives, I felt a deeper sense of understanding of her work and energy-efficient architecture overall. Looking at her work gave me a place to begin with my own design. I took inspiration from her utilization of solar spaces and let that be a guiding principle in my own work.

In other words, the time spent looking through the archival material directly taught this student both how to research architectural ideas and how to use drawings to inform their own designs.

Archival Response

The archivists' first response to this collaboration was very positive. Given that the Gates collection contained construction documents, including site plans, floor plans, sections, wall sections, and elevations of various projects, they originally contacted me for ideas on how to create engagement with these records. When the head archivist and I met with Virginia Searl (Gates's daughter, who donated the collection), we began perusing the collection, and Searl pointed out the building section and stated that Gates used it to teach about passive solar locally. As a teaching tool, the wall section worked well with the objectives of my upcoming Design II studio, wood construction. I proposed building models of that section, and the archivist stated that although she did not understand the wall section, models would be very interesting to the archive.

Hatch, the archivist, and Searl were able to see the completed student projects at the final critique. They were exceptionally pleased at how much educational value the students derived from the collection. After watching the critique, Hatch stated that the models and the projects far exceeded her expectations. The large models explained Gates's wall section drawings, and the poster created to explain the importance of the passive techniques found in the models was also clear. The student presentation boards described how the archival collection influenced their design decisions, and Hatch noted that these documents were the most used of any archival material this term (L. Hatch, interview with the author, February 27, 2026).

The content summarized as Student projects at final critique is presented in Figure Error: Reference source not found. Virginia Searl also attended the final critique. She noted the techniques that the students applied from Gates's work, and she clarified how Gates used them, critiquing each of the projects on how they could increase the effectiveness of passive solar technology. She stated that "Using Martha's standard wall section drawing as a 'construction document' and building a scale model appeared to be very useful in understanding the function of each of the materials and their locations in the wall" (V. Searl, interview with the author, February 27, 2026).

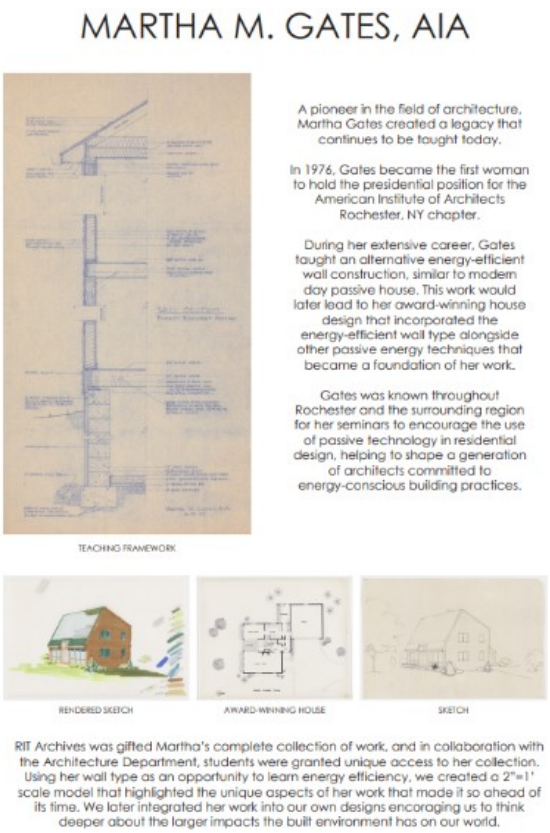


Figure 5. Poster on the Importance of Gates's Work by Students Hannah Owens, Rachael Duggan, Sam Palmer, and Isabella Petito, With Drawings From The Gates Collection. Photograph Credit: Author.

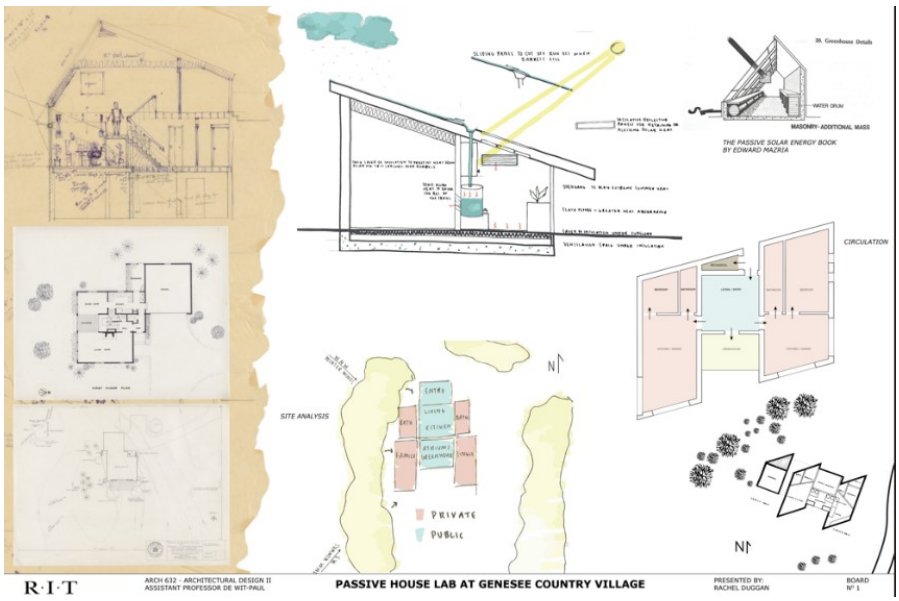


Figure 5. Example of Student Rachael Duggan Using Gates's Drawings from the Archive to Develop Her Own Design Concept (Final Board from Fall 2026 RIT Architectural Studio Design II).

Searl was also pleased that the students were not only able to understand a building section, but also to draw their

own, commenting that this section became the foundation of the students' understanding of passive solar: "For most, this seemed to be the first time thoughts were on this common and important building part, the skin of the building, and how to maximize its role in the energy conservation" (V. Searl, interview with the author, February 27, 2026). By starting with the wall section, the students learned that the building envelope drives passive design. It is the envelope that mitigates heat loss and gain, which is the premise of passive solar management. Searl went on to say, "Several commented on passive solar principles represented in Martha's work, including mass walls, window size and location, allowing passive air flow throughout." According to Searl, these beginning design students now have a working knowledge of both envelope design and energy efficiency.

Conclusion

Overall, this studio achieved its central objective: teaching students residential design and wood construction. The student projects maintained or surpassed those of previous studios, though the most common critique is that their residential space planning did not meet full architectural standards. However, for their second architectural studio, their projects were inventive and included clear explanations. Further, the project did not focus as much on space planning because it covered extra material. The students traditionally learn about wood construction and wall section technology in the "Fundamentals of Building Systems" course, which runs concurrently with Design II. The instructor and I coordinated so they could learn about wall sections the week after they built the wall section model, providing a more in-depth understanding of how this wall section translates into passive design. Based on their final critique, students developed a good basic understanding of thermal heat gain and its use in passive design. Thus, I consider this studio a success.

From a resource perspective, I have never used archival material in a studio before. It brought a sense of discovery and historical continuity for the students, and they learned in the final critique that current building codes are finally encouraging the insulation values that Gates understood and taught. As one student commented at the end of the assignment, "Ultimately, I am very grateful for the opportunity to be able to work alongside the archives and gain a deeper understanding of Martha Gates and what it means to create an energy-efficient structure." After the final critique, Landyn Hatch, the archivist, commented, "This far surpassed my expectations! We will give more room in the exhibition for this work" (L. Hatch, interview with the author, February 27, 2026). She was impressed not only with the project but also with how the students were able to articulate what they learned to a general audience. Virginia Searl stated, "My mom would be so proud! They are learning from her work about passive solar design, which was so important to her" (V. Searl, interview with the author, February 27, 2026). In sum, the archives brought together the history of ecological design and the opportunity for current practice.

Sustainable design is not new. The concepts of passive architecture we apply today were developed by pioneers in the 1970s. These architects and engineers are an untapped source of knowledge for architectural educators. However, much of their work is not found in textbooks, but in educational archives. By using the archive in architectural education, we bring the work of these pioneers to life for students. When students then use these architectural documents and concepts, subsequently explaining them to a general audience, we have successfully added to the archive. The archive then becomes a living institution, continually revitalizing the collections for

new generations.

Statements and Declarations

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Sound and Meaning in Ibn Jinnī's al-Khasāʾis: The Theory of Al-ishtiqāq Al-akbar Compared with Modern Phonosemantic Approaches

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Abstract

This study examines the relationship that Ibn Jinnī (d. 392/1002) established between sound and meaning in al-Khasāʾis, focusing on the theory he named al-ishtiqāq al-akbar, and compares it with the modern approaches that have developed since the early twentieth century under the headings of phonosemantics and sound symbolism. Ibn Jinnī turned the permutation procedure that al-Khalīl b. Ahmad had used for lexicographical arrangement in Kitāb al-ʿayn into a theory of meaning, arguing that the six permutations of a triliteral root may be gathered, through subtle interpretation, around a single core meaning. In the chapters on imsās al-alfāz ashbāh al-maʿānī, tasāqub al-alfāz and quwwat al-lafz he further sought a natural correspondence between the articulation and the features of a consonant and the event it denotes. These observations are set against Saussure's principle of the arbitrariness of the sign and against the experimental and statistical findings of Sapir, Köhler, Ramachandran and Hubbard, Magnus, and Blasi and colleagues. The study concludes that Ibn Jinnī's theory anticipates the modern notions of iconicity and systematicity, that it nevertheless remains inductive and interpretive in method, and that its evidential value rests on a deliberately non-universal framework.

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Introduction

The following proverb current among the Arabs appears at first sight to offer counsel on patience and endurance:

«قَدْ يُدْرَكُ الخَضْمُ بِالقَضْمِ»

Abundance is sometimes attained through scarcity.

Yet when it is examined with Ibn Jinnī's careful eye, this brief saying also conceals one of the oldest and most intractable questions of Arabic linguistic thought. Khadm (الخَضْم) denotes eating something moist and soft by biting into it, whereas qadm (القَضْم) denotes gnawing something dry and hard. Does the single phonetic difference between them, that is, the contrast between the lax khāʾ (خ) and the hard qāf (ق), arise from the nature of the act denoted, or is it merely the product of an accidental convention (Ibn Jinnī, 1952–1956, Vol. 2, pp. 157–158)? This question, which may be summarised as the problem of the relationship between the word and its meaning, has been raised repeatedly along a long line of reflection running from Plato's *Cratylus* to Saussure's *Course in General Linguistics*, and on each occasion it has received a different answer (Plato, 1997, 383a–384d; Saussure, 1972, pp. 100–102).

Within the Islamic scholarly tradition the question was fed by two separate currents: on the one hand the debate among the theologians over whether the origin of language is divinely instituted (tawqīfī) or conventional (istilāhī), and on the other the work of the grammarians on derivation (al-ishtiqāq) and on the features of the consonants (al-Suyūtī, n.d., Vol. 1, pp. 7–47; Sak, 2019). The point at which these two currents converge is undoubtedly al-Khasāʾis of Ibn Jinnī (d. 392/1002). Its author discussed the question of the origin of language with the eye of a linguist and, at the same time, transformed the permutation procedure (taqlīb) that al-Khalīl b. Ahmad (d. 175/791) had employed in arranging his dictionary into a theory of meaning, thereby constructing the theory he named al-ishtiqāq al-akbar. That Ibn Jinnī was the first to use this term, and that he thereby laid the foundations of the study of the origins of Arabic words, is reported in the sources as a matter of general agreement (Yavuz, 1997, pp. 275–276; Yavuz, 1999, p. 398).

When Ferdinand de Saussure's principle of the arbitrariness of the linguistic sign became one of the basic assumptions of linguistics at the beginning of the twentieth century, approaches that sought a natural relationship between word and meaning were for a long time treated as conjectures lacking scholarly seriousness (Saussure, 1972, pp. 100–101). From the second half of the same century onwards, however, work in experimental psychology, the cognitive sciences and cross-linguistic comparative research began to question that assumption seriously around such concepts as sound symbolism, iconicity and phonosemantics (Dingemanse et al., 2015, pp. 603–604; Hinton et al., 1994, pp. 1–4). The insights Ibn Jinnī articulated a thousand years ago have thus acquired a character that deserves to be read anew in a different context.

The aim of the present study is to analyse the views Ibn Jinnī advanced in al-Khasāʾis concerning the relationship

between sound and meaning, with al-ishtiqāq al-akbar at the centre and together with the other chapters that complement that theory, and then to compare those views with modern phonosemantic approaches in order to identify the similarities and the differences. A text-centred method has been followed; the edition of al-Khasāʾis prepared by Muhammad ʿAlī al-Najjār has been taken as the basis, and the relevant chapters have been subjected to close reading. Modern research has been treated in order of historical development, and the comparison has been conducted according to specific criteria such as the unit of analysis, the method, the scope of the claim, the type of evidence and the mode of explanation.

Within this framework, apart from the introduction and the conclusion, the study consists of three main parts. The first part addresses the historical background of the relationship between word and meaning in Arabic linguistic thought, together with the author and his work. The second part analyses the theory of al-ishtiqāq al-akbar and the other chapters of al-Khasāʾis that bear on the relationship between sound and meaning. The third part introduces modern phonosemantic approaches and compares them with Ibn Jinnī's observations.

Among the studies conducted in Türkiye there are valuable works on Ibn Jinnī's life and his place in grammar, on the question of the origin of language in al-Khasāʾis, on the application of al-ishtiqāq al-kabīr to Qurʾanic verses, and on the relationship between sound and meaning in the fourth/tenth century (Olgun, 2022; Özdemir, 2025; Sak, 2019; Yavuz, 1996). No independent and systematic comparison of the theory of al-ishtiqāq al-akbar with modern phonosemantic research has been encountered, however. The present study aims to be a modest contribution towards filling that gap.

The Sound–meaning Relationship in Arabic Linguistic Thought

The question of whether a natural bond exists between the sound of a word and the meaning it denotes was first treated as an independent problem in the history of reflection in Plato's dialogue *Cratylus*. In the dialogue Cratylus argues that names suit things by nature, whereas Hermogenes maintains that names are merely the product of agreement and custom. At one stage Socrates ventures an experiment in sound symbolism at the level of the individual letter, observing that the sound r imitates movement and the sound l what is smooth and soft (Plato, 1997, 383a–384d, 426c–427c). Whether this debate passed directly into Arabic linguistic thought is the subject of a separate inquiry. It can at least be said that the same question was posed anew within the Islamic scholarly tradition, through its own internal workings and along a direction of its own.

The first serious indications of a concern with the relationship between sound and meaning in Arabic linguistic thought are found in Kitāb al-ʿayn (كتاب العين) of al-Khalīl b. Ahmad (d. 175/791), the compiler of the first Arabic dictionary. Al-Khalīl arranged his dictionary not in alphabetical order but according to the order of articulation of the consonants, running from the deepest point of the throat towards the lips. For this reason the work begins with the consonant ʿayn (ع), which he held to issue from the deepest point, and takes its name from it. More importantly, al-Khalīl brought together all the possible arrangements (al-taqālīb) of the consonants that constitute each root and determined which of them were in use (al-mustaʿmal) and which were neglected (al-muhmal) (al-Khalīl b. Ahmad, n.d., Vol. 1, pp. 47–60). This procedure was in essence a quantitative device of

lexicography; by placing the different arrangements of the same consonants side by side, however, it prepared the material on which Ibn Jinnī would later build his theory (Kılıç, 2001, p. 439; Olgun, 2022).

An insight of al-Khalīl's concerning the relationship between sound and meaning has also reached the present day through Ibn Jinnī. According to the report, al-Khalīl explained as follows why the Arabs express the chirping of the cricket with the verb sarra (صَرَّ) and the cry of the falcon with sarsara (صَرْصَرَ):

«كَأَنَّهُمْ تَوَهَّمُوا فِي صَوْتِ الجُنْدُبِ اسْتِطَالَةً وَمَدًّا فَقَالُوا: صَرَّ، وَتَوَهَّمُوا فِي صَوْتِ البَازِي تَقْطِيعًا فَقَالُوا: صَرْصَرَ»

> *It is as though they perceived in the cricket's sound an extension and a prolongation and so said sarra, and perceived in the falcon's sound an interruption and so said sarsara. (Ibn Jinnī, 1952–1956, Vol. 2, p. 152)*

In arguing that the difference between the monosyllabic form of a verb and its reduplicated (mudāʿaf rubāʿī) form corresponds to the continuity or the interruption of the sound denoted, this statement constitutes one of the earliest known descriptions of the phenomenon known in modern linguistics as iconic repetition. Al-Khalīl's student Sībawayhi (d. 180/796) recorded for his part that verbal nouns formed on the pattern faʿalān (فَعَلان) mostly denote agitation, turbulence and movement, and he indicated that in examples such as al-nazawān (النَّزَوان: leaping and stirring) and al-ghalayān (الغَلَيان: boiling) the succession of vowels in the pattern reflects the movement in the action (Ibn Jinnī, 1952–1956, Vol. 2, pp. 152–153; Sībawayhi, 1988, Vol. 4, pp. 14–15). That Ibn Jinnī cites both of these observations with respect at the opening of his own chapter is a clear sign of his concern to ground his theory in his predecessors.

The theological dimension of the question was debated more sharply from the third/ninth century onwards. According to what al-Suyūtī reports from the scholars of legal theory, the Muʿtazilī theologian ʿAbbād b. Sulaymān al-Saymarī held that there exists between the word and the thing named a natural relationship (مناسبة طبيعية) that led the one who assigned the word to allocate a particular word to a particular meaning. ʿAbbād's reasoning is rational in character: were there no such relationship, the allocation of a given name to a given thing would be a preference made without any ground of preference (ترجيح بلا مرجّح). The same source also reports that when someone who shared ʿAbbād's view was asked the meaning of the word idhghāgh (إذغاغ), which he was told meant "stone" in Persian, he replied that he found in it an intense dryness and therefore thought it to be a stone (al-Suyūtī, n.d., Vol. 1, p. 47). Al-Suyūtī's remark in the same place unties the real knot of the question: the scholars of language and of Arabic were almost unanimous in accepting that a relationship exists between word and meaning; what separated them from ʿAbbād was that they did not regard this relationship as an essential cause that necessitates (مُوجِب) the assignment.

In the same centuries the question of whether the origin of language is a divine instruction (توقيف) or an

agreement reached among human beings (اصطلاح) also constituted a broad field of debate between theology and the linguistic sciences. Scholars such as Ibn Fāris (d. 395/1004) argued that language is divinely instituted, relying on the following verse:

«وَعَلَّمَ آدَمَ الأَسْمَاءَ كُلَّهَا»

And He taught Adam all the names. (al-Baqara 2/31)

The majority of the Muʿtazilī theologians, by contrast, inclined towards the conventionalist view (al-Suyūtī, n.d., Vol. 1, pp. 8–10; Sak, 2019). Although the thesis of a natural relationship appears at first sight to conflict with the conventionalist view, it in fact possesses a flexibility that allows it to be articulated with either position. For whether words were assigned by divine instruction or by human agreement, it can be maintained that the assignment was not arbitrary but wise, and that in some words this wisdom manifests itself as a correspondence between sound and meaning. Ibn Jinnī's approach to the question took shape precisely on this flexible ground.

In sum, when Ibn Jinnī appeared on the scene he had three distinct legacies at his disposal: the permutation procedure and the classification of sounds inherited from al-Khalīl; the scattered but accurate observations that al-Khalīl and Sībawayhi had made about the relationship between sound and meaning; and, finally, the debates of the theologians over natural relationship and the origin of language. The originality of al-Khasāʾis lies in its uniting of these three legacies within a single theoretical framework (Özdemir, 2025; Yavuz, 1999, p. 398).

Ibn Jinnī and al-Khasāʾis

A brief account of the life and work of the author who united these three legacies within a single framework will be useful for understanding the background of his theory. Abū al-Fath ʿUthmān b. Jinnī was born in Mosul. His date of birth is given differently in the sources. His father was a man of Greek origin, a freedman of Sulaymān b. Fahd al-Azdī, one of the notables of Mosul. The epithet "Jinnī" by which the author became known is reported to be the Arabicised form of a Greek word meaning "noble, generous, respected" (Yavuz, 1999, p. 397). Having completed his early education in Mosul, Ibn Jinnī began while still young to teach morphology and syntax in the mosque. According to a well-known incident reported in the sources, Abū ʿAlī al-Fārisī (d. 377/987) one day came upon his circle and, failing to receive the answer he expected to a question he asked about morphology, said to the young teacher:

«زَبَّبْتَ وَأَنْتَ حِصْرِمٌ»

You have turned into a raisin while you are still an unripe grape. (Yāqūt al-Hamawī, 1936–1938, Vol. 12, pp. 90–91; Yavuz, 1999, p. 397)

When Ibn Jinnī learned who it was that stood before him, he abandoned his own teaching, became al-Fārisī's student and did not leave his master's side for some forty years. This long collaboration between student and

master is also evident from the fact that Abū ʿAlī's views are mentioned on almost every page of al-Khasāʾis. Having spent time in such centres of learning and culture of the age as Aleppo, Damascus, Wāsit and Shīrāz, having formed a close friendship with the poet al-Mutanabbī and having taken part in the scholarly assemblies of the Buyid court, Ibn Jinnī passed the last years of his life in Baghdad and died there on 28 Safar 392 (16 January 1002) (Yavuz, 1999, pp. 397–398). The most important feature that defines his scholarly personality is his supra-school attitude: he moved beyond the classical understanding of grammar based on the Basran–Kufan rivalry of his day and interrogated the origin of language, its causes and its internal logic. Although he speaks of the Basrans as "our colleagues", his statement that the closeness between himself and the Basrans lies not in method but in substance constitutes a concise expression of this attitude (Ibn Jinnī, 1966–1969, Vol. 1, p. 167; Yavuz, 1999, p. 398).

Al-Khasāʾis is among Ibn Jinnī's later works. The fact that the author mentions his master Abū ʿAlī al-Fārisī with the formula of mercy indicates that the book was written after 377/987, while the references he makes to Sirr sināʿat al-iʿrāb and al-Munsif show that it is a product of his scholarly maturity. The work was presented to the Buyid amīr Bahāʾ al-Dawla (Yavuz, 1997, p. 275). In the preface the author states that, just as jurisprudence and theology each have a methodology, syntax too ought to have one, that no satisfactory work had been written in this field before him, and that he composed his book in order to set out the methodology of syntax. The work, however, which consists of 162 chapters, went far beyond the methodology of syntax in the narrow sense; it also treats such questions as the definition of language, its origin, dialects, derivation, assimilation, the relationship between word and meaning, and the relation of consonants to meanings, matters that today fall within philology and the philosophy of language (Ibn Jinnī, 1952–1956, Vol. 1, pp. 1–2; Yavuz, 1997, pp. 275–276).

That the question of the relationship between sound and meaning occupies a central place in al-Khasāʾis can be traced from the author's very definition of language onwards. Ibn Jinnī defines language as follows:

«حَدُّهَا أَنَّهَا أَصْوَاتٌ يُعَبِّرُ بِهَا كُلُّ قَوْمٍ عَنْ أَغْرَاضِهِمْ»

> *Its definition is this: it consists of sounds by which every people expresses its purposes. (Ibn Jinnī, 1952–1956, Vol. 1, p. 33)*

The first point that stands out in this definition is that the substance of language is identified not as writing or as the word but as sound (أصوات). The second is the presentation of language as a social phenomenon belonging to a community (قوم), and the third is its characterisation as a means of expressing a purpose (غرض). Once the essence of language is sound, the question of the extent to which sound itself participates in meaning arises as a natural consequence of the definition. For if sound is merely a vessel that carries meaning, the relationship between sound and meaning will be accidental; if the nature of the sound itself contributes something to the meaning, that relationship will express a wisdom.

Ibn Jinnī also touches on this question in the chapter on the origin of language. There he first mentions the view that language is divinely instituted and his master Abū ʿAlī's inclination towards it, then the conventionalist view

adopted by the majority of the speculative thinkers, and finally reports a third view as follows:

«وَذَهَبَ بَعْضُهُمْ إِلَى أَنَّ أَصْلَ اللُّغَاتِ كُلِّهَا إِنَّمَا هُوَ مِنَ الأَصْوَاتِ المَسْمُوعَاتِ، كَدَوِيِّ الرِّيحِ، وَحَنِينِ الرَّعْدِ، وَخَرِيرِ المَاءِ، وَشَحِيحِ الحِمَارِ، وَنَعِيقِ الغُرَابِ، وَصَهِيلِ الفَرَسِ، وَنَزِيبِ الظَّبْيِ، وَنَحْوِ ذَلِكَ، ثُمَّ وُلِّدَتِ اللُّغَاتُ عَنْ ذَلِكَ فِيمَا بَعْدُ. وَهَذَا عِنْدِي وَجْهٌ صَالِحٌ، وَمَذْهَبٌ مُتَقَبَّلٌ»

> *Some have held that the origin of all languages lies in audible sounds, such as the howling of the wind, the moaning of thunder, the murmuring of water, the braying of the donkey, the cawing of the crow, the neighing of the horse, the cry of the gazelle and the like, and that languages were afterwards generated from these. This, in my view, is a sound position and an acceptable doctrine. (Ibn Jinnī, 1952–1956, Vol. 1, pp. 46–47)*

This view, which holds that all languages gradually developed out of the first words born from the imitation of natural sounds, resembles the imitation theory that was derided in the West in the nineteenth century (Jespersen, 1922, pp. 413–415). That Ibn Jinnī describes it as “a sound position and an acceptable doctrine” is noteworthy. At the end of the chapter, however, the author reaches no definite judgement. He states that the subtlety and wisdom borne by language incline him to attribute it to divine instruction, while the conventionalist view too rests on reasonable evidence, and he confesses that he remains undecided between the two positions (Ibn Jinnī, 1952–1956, Vol. 1, pp. 40–47).

Although this hesitation appears at first sight to be a weakness, it in fact prepared an extremely fertile ground for Ibn Jinnī’s theory of sound and meaning. Rather than leaning on one of the parties to the theological dispute, the author set out to show that, whichever view is accepted, an observable correspondence between sound and meaning exists in language. As Sak (2019) has also observed, Ibn Jinnī’s chapter on the origin of language should be read less as participation in a theological disputation than as an effort to construct a theoretical framework for his own linguistic work, sound symbolism above all.

Sound and Meaning in Al-Khasāʾis

Lexically meaning “to take half of something, to split something”, the term ishtiqāq (الاشتقاق) denotes technically the taking and derivation of one of two words related in meaning from the other. The original word from which derivation proceeds is called al-mushtaqq minhu (المشتقّ منه), and the secondary word derived from it al-mushtaqq (المشتقّ) (Kılıç, 2001, p. 439). In the Arabic linguistic tradition, derivation was for a long time understood predominantly as a matter of morphology, namely the production of new words from a single root through various patterns. In al-Khasāʾis, however, Ibn Jinnī divides derivation into two: the lesser derivation (الاشتقاق الصغير) and the greater derivation (الاشتقاق الأكبر).

Lesser derivation is, in the author’s formulation, the taking of a root and the gathering of its derivatives around a single meaning, however different their patterns and forms may be. Ibn Jinnī illustrates this with the root s-l-m: salima (سَلِمَ), yaslamu (يَسْلَمُ), sālim (سالِم), Salmān (سَلْمان), Salmā (سَلْمى), al-salāma (السَّلامة) and

al-salīm (السَّليم), the last used euphemistically of one bitten by a snake, all converge on the meaning of “soundness” without any change in the order of the consonants. This kind of derivation is easily recognised, and it is generally what grammarians mean when they speak of “derivation” (Ibn Jinnī, 1952–1956, Vol. 2, pp. 133–134).

Al-Ishtiqāq Al-akbar

Ibn Jinnī defines the greater derivation as follows:

«وَأَمَّا الاشْتِقَاقُ الأَكْبَرُ فَهُوَ أَنْ تَأْخُذَ أَصْلًا مِنَ الأُصُولِ الثُّلَاثِيَّةِ فَتَعْقِدَ عَلَيْهِ وَعَلَى تَقَالِيبِهِ السِّتَّةِ مَعْنًى وَاحِدًا، تَجْتَمِعُ التَّرَاكِيبُ السِّتَّةُ وَمَا يَتَصَرَّفُ مِنْ كُلِّ وَاحِدٍ مِنْهَا عَلَيْهِ، وَإِنْ تَبَاعَدَ شَيْءٌ مِنْ ذَلِكَ عَنْهُ رُدَّ بِلُطْفِ الصَّنْعَةِ وَالتَّأْوِيلِ إِلَيْهِ، كَمَا يَفْعَلُ الاشْتِقَاقِيُّونَ ذَلِكَ فِي التَّرْكِيبِ الوَاحِدِ»

> *As for the greater derivation, it is that you take one of the triliteral roots and establish upon it and upon its six permutations a single meaning, so that the six combinations and whatever is derived from each of them are gathered around it; and if any of them moves away from that meaning, it is brought back to it by a subtle craft and interpretation, just as the derivationists do within a single combination. (Ibn Jinnī, 1952–1956, Vol. 2, p. 134)*

This definition expresses a radical expansion of the understanding of derivation. In lesser derivation the bearer of meaning is the consonants in a particular order; in greater derivation the consonants themselves, that is, the “material” composed of three consonants, are held to bear meaning independently of their order. In other words, Ibn Jinnī attaches meaning not so much to the arrangement of the consonants as to their substance, that is, to sound itself. It is precisely here that the real importance of the theory for the relationship between sound and meaning lies.

At this point a terminological matter requires attention. The permutation-based derivation that Ibn Jinnī named al-ishtiqāq al-akbar came in later periods, and especially in modern Arabic linguistic scholarship, to be called mostly al-ishtiqāq al-kabīr (الاشتقاق الكبير), while the term al-ishtiqāq al-akbar was reserved for derivation between words that share two radical consonants and whose third consonants are close in place of articulation, that is, for lexical substitution (الإبدال اللغوي). In this later classification, the blending of more than one word through abbreviation (النحت) was counted as a fourth type under the name al-ishtiqāq al-kubbār (الاشتقاق الكُبّار) (Abdullah Amīn, 1956; Kılıç, 2001, pp. 439–440). In the present study the author’s own terminology is retained, so that permutation-based derivation is referred to as al-ishtiqāq al-akbar, while derivation based on substitution is treated under the heading of tasāqub, which Ibn Jinnī addresses in a separate chapter.

Before announcing the theory of al-ishtiqāq al-akbar in its own chapter, Ibn Jinnī had already applied the procedure in the very first chapter of al-Khasāʾis, while explaining the difference between kalām (الكلام) and qawl (القول). There he seeks to show that the six arrangements of the material k-l-m converge on the meaning of “strength and

intensity", and the six arrangements of the material q-w-l on the meaning of "lightness and movement" (Ibn Jinnī, 1952–1956, Vol. 1, pp. 5–17). Accordingly, kalm (الكَلْم) means "wound", and a wound is the effect of a violence that leaves a trace where it is opened. Kalām in the sense of speech is likewise connected with this root because of the impression it leaves on the heart and the mind. Lakm (اللَّكْم) means "to strike with the fist" and milk (المِلْك) "to possess, to hold under one's dominion", and in both the meaning of strength is evident. Kamāl (الكَمال) too denotes the completion of strength and power. In the material qawl, on the other hand, what is taken as fundamental is the light and swift movement of the tongue in the mouth and the ease with which an utterance passes into circulation, and the other arrangements are likewise referred back to the meanings of lightness, swiftness and movement.

This first application has a telling aspect: Ibn Jinnī attempts to explain a question as important for grammar and logic as the distinction between kalām and qawl by grounding it in the basic meaning borne by the phonetic material of the two words. On this approach, the use of kalām for independent and complete utterance, and of qawl for every utterance issuing from the mouth whether complete or not, is a natural extension of the meanings of "strength and completeness" in the material k-l-m and of "lightness and swiftness" in the material q-w-l.

The chapter in which the theory is treated independently, Bāb fī al-ishtiqāq al-akbar (باب في الاشتقاق الأكبر), is found in the second volume of al-Khasāʾis. At the beginning of the chapter Ibn Jinnī states that no linguist before him had named this procedure, that his master Abū ʿAlī al-Fārisī had occasionally resorted to it where lesser derivation proved insufficient but had given it no name, and he declares explicitly that the name is his own:

«وَإِنَّمَا هَذَا التَّلْقِيبُ لَنَا نَحْنُ»

This designation, however, belongs to us alone. (Ibn Jinnī, 1952–1956, Vol. 2, p. 133)

In this chapter the author illustrates his theory through several roots. One of them is the material j-b-r. According to Ibn Jinnī the common meaning in the arrangements of this material is "strength and intensity". Jabr (الجَبْر) is to bind and consolidate a broken bone and thus to strengthen it. Burj (البُرْج) is the tower, the most solid and best protected part of a fortress. Jirāb (الجِراب) is the bag that protects and holds together whatever is placed in it. The verb rajiba (رَجِبَ) is used in the sense of exalting and honouring someone, attributing strength and esteem to him. In another example, the material q-s-w, the common meaning is identified as "strength and gathering". Qaswa (القَسْوة), denoting hardness of heart, qaws (القَوْس), the bow that stiffens as it is drawn, and wasq (الوَسْق), meaning to bring together and gather a load, are united around this common meaning (Ibn Jinnī, 1952–1956, Vol. 2, pp. 135–136).

In all these examples Ibn Jinnī's method is the same. The most salient and concrete among the arrangements of the material is first identified; a general meaning extracted from it, such as strength, intensity, lightness or gathering, is then carried over to the other arrangements; and usages that fall far from this meaning are attached to it by "a subtle craft and interpretation" (لطف الصنعة والتأويل). The author also accepts that not all the

arrangements are in use and that some remain neglected in the speech of the Arabs. This shows that the theory is inductive in structure, seeking a common denominator on the basis of attested usage.

The most striking feature of the author's stance in this chapter is that he himself draws the limits of his theory. Ibn Jinnī states explicitly that he does not claim the greater derivation to be operative throughout the whole of language, just as he makes no such claim for lesser derivation; he describes the procedure as a difficult, subtle and demanding path, which nevertheless opens a valuable window onto the wisdom of language wherever it is found (Ibn Jinnī, 1952–1956, Vol. 2, pp. 138–139). In short, al-ishtiqāq al-akbar is in Ibn Jinnī's hands not a "law" but a "possibility of discovery".

The theory was not received with equal enthusiasm by all later scholars. Al-Suyūtī records that the procedure was an innovation of Ibn Jinnī's, that his master Abū ʿAlī had shown it only a slight familiarity, that it is not reliable evidence in matters of language and that it cannot serve as a basis for inferring derivation in Arabic. In al-Suyūtī's view Ibn Jinnī used the procedure in order to display his skill in referring different words back to a common denominator, and he knew perfectly well that this common meaning was not the actual reason for the assignment of those words (al-Suyūtī, n.d., Vol. 1, p. 347).

This criticism points to three fundamental weaknesses of the theory. The first is that the concepts identified as the common meaning, such as strength, intensity and movement, are extremely broad and abstract. This breadth makes it possible for almost any word to be attached in some way to one of these concepts and lends the theory an unfalsifiable character. The second is that the referrals effected by "a subtle craft and interpretation" depend excessively on the skill and the intention of the investigator. The third is that, in selecting examples that support his theory, the author did not systematically review the roots that do not support it. Put in the language of present-day scholarship, the theory faces the danger of confirmation bias, that is, of the investigator attending only to the examples that corroborate his own conviction.

The attitude of Ibn Jinnī's contemporary Ibn Fāris (d. 395/1004) offers a suitable basis for comparison in this respect. In Muʿjam maqāyīs al-lugha (معجم مقاييس اللغة) Ibn Fāris argued that the Arabic language has sound measures (مقاييس) and roots from which branches ramify, and he identified a few basic meanings under each root and attached the derivatives to those meanings. In doing so, however, he kept the order of the consonants fixed, that is, he did not step outside the field of lesser derivation (Ibn Fāris, 1979, Vol. 1, p. 3; Kılıç, 2001, p. 439). Read together with Ibn Jinnī's bolder venture, Ibn Fāris's cautious attitude shows that in fourth/tenth-century Arabic linguistic thought the relationship between sound and meaning was treated at two distinct levels: one at the level of the ordered root, the other at the level of the unordered phonetic material.

For all these criticisms, the scholarly value of the theory of al-ishtiqāq al-akbar should not be underestimated. The theory rests on the fact that in a language such as Arabic, with its root-and-pattern structure, the real bearers of meaning are the consonants, and it carries that fact one step further by asking whether the phonetic features of the consonants themselves also participate in the meaning. That the biradicalist (الثنائية) approach among modern Arabic linguists, which holds that roots are in fact biconsonantal, draws its evidence largely from the observations

of fourth/tenth-century scholars and of Ibn Jinnī in particular, is an indication of the theory's fruitfulness (Özdemir, 2025). A recent study conducted in Türkiye likewise applied the procedure of al-ishtiqāq al-kabīr to the roots b-h-r and h-l-m and demonstrated concretely both the possibility and the limits of capturing a common meaning among permuted roots (Olgun, 2022).

Al-Ishtiqāq al-akbar is the most ambitious and the best known face of Ibn Jinnī's theory of sound and meaning, but it is not its only face. In the second and third volumes of al-Khasāʾis the author treats the same question at different levels in three mutually complementary chapters. Reading these chapters together is indispensable for grasping the unity of the theory.

Making Words Touch the Likenesses of Meanings

The chapter that contains the richest material on the relationship between sound and meaning is Imsās al-alfāz ashbāh al-maʿānī (باب في إمساس الألفاظ أشباه المعاني), which may be rendered as "making words touch the likenesses of meanings". The author opens the chapter with the following sentence:

«اعْلَمْ أَنَّ هَذَا مَوْضِعٌ شَرِيفٌ لَطِيفٌ، وَقَدْ نَبَّهَ عَلَيْهِ الخَلِيلُ وَسِيبَوَيْهِ، وَتَلَقَّتْهُ الجَمَاعَةُ بِالقَبُولِ لَهُ وَالاعْتِرَافِ بِصِحَّتِهِ»

> *Know that this is a noble and subtle topic. Al-Khalīl and Sībawayhi drew attention to it, and the community of scholars received it with acceptance and acknowledged its soundness. (Ibn Jinnī, 1952–1956, Vol. 2, p. 152)*

Unlike the self-assured stance of "I gave this name myself" in the chapter on al-ishtiqāq al-akbar, this opening sentence shows that here the author leans on a consensus, or at the very least on a broad acceptance. Indeed, a significant part of the observations in this chapter were, unlike al-ishtiqāq al-akbar, largely adopted by later scholars as well. The difference in tone between the two chapters is itself an indication of how the author assessed the evidential weight of his own claims.

The author treats the relationship between sound and meaning at two levels in this chapter. The first is the level of the pattern. After reporting al-Khalīl's observation on sarra and sarsara and Sībawayhi's on faʿalān, Ibn Jinnī notes that by doubling the middle consonant of a verb the Arabs express repetition and multiplicity in the action, deriving kassara (كَسَّرَ) from kasara (كَسَرَ) and qattaʿa (قَطَّعَ) from qataʿa (قَطَعَ). In his view, in the meanings denoted by verbs the doubling of the middle consonant, the strongest consonant, has been made an indication of the strength and the repetition of the meaning (Ibn Jinnī, 1952–1956, Vol. 2, p. 155).

The second and deeper level is that of the individual consonant. In moving to this level the author says:

«فَأَمَّا مُقَابَلَةُ الأَلْفَاظِ بِمَا يُشَاكِلُ أَصْوَاتَهَا مِنَ الأَحْدَاثِ فَبَابٌ عَظِيمٌ وَاسِعٌ»

> *As for setting words opposite the events that resemble their sounds, this is a great and wide chapter. (Ibn Jinnī, 1952–1956, Vol. 2, p. 157)*

The best-known example of this level is the pair khadm (الخَضْم) and qadm (القَضْم) mentioned in the introduction. Khadm is to eat moist and juicy things such as melon and cucumber; qadm is to eat dry and hard things, as an animal gnaws its barley. Concerning the consonants that constitute the sole difference between the two words, the author says:

«فَاخْتَارُوا الخَاءَ لِرَخَاوَتِهَا لِلرَّطْبِ، وَالقَافَ لِصَلَابَتِهَا لِلْيَابِسِ، حَذْوًا لِمَسْمُوعِ الأَصْوَاتِ عَلَى مَحْسُوسِ الأَحْدَاثِ»

> *They chose khāʾ (خ) for what is moist because of its laxity, and qāf (ق) for what is dry because of its hardness, fashioning the sounds that are heard after the events that are sensed. (Ibn Jinnī, 1952–1956, Vol. 2, pp. 157–158)*

The last part of this sentence, namely “fashioning the sounds that are heard after the events that are sensed”, constitutes something like the formula of Ibn Jinnī’s theory of sound and meaning. Here the author establishes a parallel between sound, which addresses the sense of hearing, and the event, which addresses the other senses of touch and taste. Expressed in the language of the modern cognitive sciences, this is a claim about cross-modal mapping.

In the same chapter the author cites further comparable pairs. These pairs, whose transliterations into Latin characters are nearly identical, are given here with their Arabic spellings: النَّضْح denotes the gentle seeping or sprinkling of water and similar liquids, whereas النَّضْخ denotes a more forceful gushing, since khāʾ (خ) is a thicker and stronger sound than hāʾ (ح). Qadd (القَدّ) is to cut something lengthwise and qatt (القَطّ) to cut it crosswise, for the sound of tāʾ (ط) is shorter and more clipped than that of dāl (د) and has therefore been assigned to the act of cutting over a shorter distance (Ibn Jinnī, 1952–1956, Vol. 2, p. 158).

Ibn Jinnī does not stop here. He further argues that the order of the consonants within a word imitates the order of the phases of the event. The most striking example in this connection is the word bahth (البَحْث: to search, to scratch about). According to the author, the consonant bāʾ (ب) with its thick sound suggests the striking of the paw upon the ground; hāʾ (ح) with its muffled sound the sinking of the lion’s claw or the wolf’s nail into the soil; and thāʾ (ث) the scattering of the earth all around.

The arrangement of the consonants in the word thus depicts the phases of the act of scratching in their proper order (Ibn Jinnī, 1952–1956, Vol. 2, pp. 162–164). So detailed an application of the phenomenon known in modern linguistics as sequential iconicity, at the level of sounds within a single word, is rarely encountered in classical

works.

The Proximity of Words for the Proximity of Meanings

The chapter immediately preceding the one on imsās, Tasāqub al-alfāz li-tasāqub al-maʿānī (باب في تصاقب الألفاظ لتصاقب المعاني), may be rendered as “the proximity of words on account of the proximity of meanings”. What is treated here is the semantic proximity between words that share two radical consonants and whose third consonants are close in place or manner of articulation. As indicated above, in later periods the name al-ishtiqāq al-akbar came to be reserved for this type.

The author’s best-known example in this chapter is the following expression from the Sūrat Maryam:

«تَؤُزُّهُمْ أَزًّا»

The devils incite and unsettle them vehemently. (Maryam 19/83)

According to Ibn Jinnī, azz (الأَزّ) means “to disturb and unsettle”, and this meaning is close to that of hazz (الهَزّ: to shake). The only difference between the two words lies in the consonants hamza (ء) and hāʾ (ه), and these two are siblings in place of articulation. The Arabs nevertheless assigned this meaning to the hamza, because the hamza is stronger than hāʾ and because this meaning is greater in the soul than the meaning of hazz, since a person can also shake trivial things such as a log or the trunk of a tree (Ibn Jinnī, 1952–1956, Vol. 2, p. 146). Another example is the pair ʿasf (العَسْف) and asaf (الأَسَف). ʿAsf is oppression and injustice, while asaf is grief and sorrow. The difference between ʿayn (ع) and hamza (ء), which are close in place of articulation, corresponds to the proximity between cause and effect: the one who suffers oppression falls into grief (Ibn Jinnī, 1952–1956, Vol. 2, pp. 146–147).

The contribution of this chapter to the theory of sound and meaning lies in its showing that the relationship is not binary but graded. The closer two sounds are to each other, the closer the meanings they denote; and the stronger the sound, the stronger the meaning is held to be. This approach may be read as an early formulation of the idea of systematicity in modern phonosemantics, which might be expressed as the principle that the greater the phonetic similarity, the greater the semantic similarity.

The Strength of the Word for the Strength of the Meaning

In the short chapter in the third volume entitled Quwwat al-lafz li-quwwat al-maʿnā (باب في قوة اللفظ لقوة المعنى), Ibn Jinnī argues that additions made to the structure of a word indicate an intensification in its meaning. Examples such as ikhshawshana (اخْشَوْشَنَ: became very coarse) from khashuna (خَشُنَ: became coarse and rough), iʿshawshaba (اعْشَوْشَبَ: the ground became covered with lush grass) from aʿshaba (أَعْشَبَ: the ground

turned green), and iqtadara (اقْتَدَرَ: had power with complete capability) from qadara (قَدَرَ: had power) are cited to show that increase in the word is evidence of increase in the meaning (Ibn Jinnī, 1952–1956, Vol. 3, pp. 264–268). The phenomenon known in modern linguistics as quantitative iconicity, or the principle of “more form, more meaning”, is clearly described in this chapter.

When these three chapters are considered together with the theory of al-ishtiqāq al-akbar, it becomes clear that Ibn Jinnī conceived the relationship between sound and meaning not at a single level but in five interconnected layers. Table 1 presents these layers and their possible counterparts in modern linguistics (Dingemanse et al., 2015, pp. 604–607; Hinton et al., 1994, pp. 1–6).

Table 1. Layers of the Sound–Meaning Relationship in al-Khasāʾis

Layer	**Chapter in al-Khasāʾis**	**Example**	**Modern counterpart**
Feature of the consonant	Imsās al-alfāz	الخضم / القضم ، النضح / النضخ	Sound symbolism
Order of the consonants	Imsās al-alfāz	البحث	Sequential iconicity
Pattern and structure	Imsās al-alfāz; Quwwat al-lafz	كسّر ، صرصر ، اخشوشن	Quantitative iconicity, iconic repetition
Proximity of articulation	Tasāqub al-alfāz	الأزّ / الهزّ ، العسف / الأسف	Phonaesthemes, systematicity
Unordered phonetic material	al-Ishtiqāq al-akbar	ك ل م ، ج ب ر ، ق س و	Systematicity at the level of the root

As the table shows, Ibn Jinnī’s theory of sound and meaning displays a structure that widens from the phonetic feature of the individual consonant, the smallest unit, to the unordered phonetic material, the largest unit. What is striking is that the degree of accuracy of the observations stands in inverse proportion to this widening. The observations at the level of the consonant and the pattern, in the chapters on imsās and quwwat al-lafz, were both widely accepted in the classical period and are largely confirmed by modern research, whereas al-ishtiqāq al-akbar, at the level of the unordered phonetic material, was criticised in the classical period and has remained the layer that is most difficult to test by modern criteria. This finding also forms the main axis of the comparison that follows.

Modern Phonosemantic Approaches

The outlook of modern linguistics on the relationship between sound and meaning has been shaped largely by the principle of the arbitrariness of the linguistic sign set out by Ferdinand de Saussure in his *Cours de linguistique générale*. For Saussure the bond between the signifier (the sound image) and the signified (the concept) is arbitrary. There is, for example, no intrinsic relation in French between the concept of “sister” and the sequence

of sounds that expresses it, and the same concept is expressed in other languages by wholly different sound sequences. Saussure concedes that onomatopoeic words and interjections might be adduced as objections to this principle. In his view, however, these are not constitutive elements of the linguistic system; they are few in number and are themselves partly conventional (Saussure, 1972, pp. 100–102).

An observation of Saussure's that is frequently overlooked is nevertheless of great importance for the comparison to be drawn with Ibn Jinnī. Saussure distinguishes between absolute arbitrariness and relative motivation. In French, *vingt* meaning "twenty" is arbitrary, whereas *dix-neuf* meaning "nineteen" is relatively motivated by the elements that compose it. In every language absolutely arbitrary elements and relatively motivated elements coexist, and languages differ in the proportion between the two (Saussure, 1972, pp. 180–184). Ibn Jinnī's observations at the level of quwwat al-lafz and of the pattern may be read as an attempt to extend the boundaries of this domain of relative motivation towards sound itself.

Arbitrariness and the First Experiments

In the years when Saussure's principle was becoming dominant in linguistics, the first experimental studies of sound symbolism also began. In the section of his *Language* devoted to sound symbolism, the Danish linguist Otto Jespersen drew attention to the frequent occurrence of close, high front vowels such as i in words denoting smallness in many languages, as in English *little*, French *petit* and Italian *piccolo*, and argued that sound symbolism is a factor in the development of language that ought not to be neglected (Jespersen, 1922, pp. 396–411).

The first to test this intuition experimentally was Edward Sapir. In a study published in 1929, Sapir presented participants with pairs of invented words differing only in their vowels, such as *mal* and *mil*, and asked which of them denoted a large and which a small table. The great majority of participants matched the word containing the vowel a with the large table and the one containing the vowel i with the small one (Sapir, 1929). In the same years Wolfgang Köhler, one of the founders of Gestalt psychology, showed participants two shapes, one angular and spiky, the other rounded, and asked which was *takete* and which *maluma*. Participants overwhelmingly matched the spiky shape with *takete* and the rounded shape with *maluma* (Köhler, 1947, pp. 224–225).

The significance of these experiments for Ibn Jinnī is evident. In the example of khadm (الخضم) and qadm (القضم), the matching of a lax sound with a moist and soft object and of a hard sound with a dry and solid one is a claim of cross-modal mapping of exactly the same kind as Köhler's rounded–spiky distinction. The difference lies in the fact that Ibn Jinnī identified the mapping through existing words, whereas Köhler tested it experimentally with invented ones.

Phonaesthemes, Phonosemantics and Cross-linguistic Evidence

The English linguist J. R. Firth, noticing that certain clusters of sounds in English regularly co-occur with certain semantic fields, gave them the name "phonaestheme". Well-known examples of this type are English words

beginning with *gl-*, such as *glow, glitter, gleam* and *glisten*, which relate to light and brightness, and words beginning with *sn-*, such as *snout*, *sniff* and *snore*, which relate to the nose. Phonaesthemes are not affixes, since no meaningful remainder is left when they are detached from the word. Benjamin Bergen's experimental study nevertheless showed that phonaesthemes have a genuine counterpart in the minds of speakers, in that words sharing the same phonaestheme facilitate one another's comprehension in mental processing (Bergen, 2004; Firth, 1930).

One of the works that placed research on sound symbolism within a comprehensive theoretical framework is the volume *Sound Symbolism*, edited by Leanne Hinton, Johanna Nichols and John J. Ohala. In their introduction the editors distinguish four types of sound symbolism. Corporeal sound symbolism comprises sounds such as coughing and hiccupping that reflect the inner state of the speaker. Imitative sound symbolism comprises onomatopoeic words that imitate the sounds of the environment. Synaesthetic sound symbolism is the expression of a non-acoustic property, such as size, shape or movement, by means of particular sounds. Conventional sound symbolism is the language-specific association of particular clusters of sounds with particular meanings (Hinton et al., 1994, pp. 2–6). In the same volume Ohala argued that the association of high-pitched sounds with smallness and harmlessness, and of low-pitched sounds with largeness and threat, rests on a biological "frequency code" observable in the animal kingdom as well (Ohala, 1994).

Köhler's experiment was repeated in 2001 by V. S. Ramachandran and E. M. Hubbard with the words *bouba* and *kiki*. Some ninety-five per cent of participants matched the spiky shape with *kiki* and the rounded shape with *bouba* (Ramachandran & Hubbard, 2001, p. 19). Ramachandran and Hubbard explained this result in terms of cross-activation between sensory and motor areas of the brain, arguing that there is a cross-modal mapping between the visual property of the spiky shape, the sharpness of the sound *kiki* and the abrupt movement of the tongue in the mouth. More importantly, the researchers suggested that mappings of this kind might offer an account of the origin of language, and that the first words may have been built upon such natural mappings (Ramachandran & Hubbard, 2001, pp. 19–22). This idea may be regarded as a modern interpretation of the imitation view that Ibn Jinnī described as "a sound position" in his chapter on the origin of language.

The term phonosemantics gained currency through the work of Margaret Magnus, who treated the relationship between sound and meaning as an independent field of research. In her doctoral dissertation completed at Trondheim, Magnus argued that each phoneme is statistically associated with a particular semantic field and that this association is especially marked in word-initial consonants. On the basis of data obtained both from surveys of the monosyllabic words of English and from experiments in which participants were given invented words and asked to define them, she maintained that words sharing the same sound cluster semantically to a degree that cannot be explained by chance (Magnus, 2001).

Magnus's approach bears a striking resemblance to Ibn Jinnī's in two respects. First, both take as the bearer of meaning not the word as a whole but the individual sounds that compose it. Second, both conceive the relationship between sound and meaning not as a given sound necessarily requiring a given meaning but as a tendency towards a particular semantic field. Magnus's method, however, unlike Ibn Jinnī's, rests on a systematic survey of the

lexicon and on statistical comparison.

In recent years research on the relationship between sound and meaning has entered a new phase with the resources of the cognitive sciences and of cross-linguistic comparative work. The comprehensive review published by Mark Dingemanse and colleagues in 2015 argued that arbitrariness alone does not account for the vocabulary of language and that two further kinds of non-arbitrary relation exist alongside it. Iconicity is the resemblance of some aspects of form to some aspects of meaning. Systematicity is the capacity of statistical regularities in form to predict certain properties of meaning, such as grammatical function. In the authors' view these three principles serve different functions: iconicity facilitates word learning and communication, systematicity assists category learning, and arbitrariness makes meanings distinguishable from one another (Dingemanse et al., 2015, pp. 603–606).

The most striking findings in this field have come from the study published by Damián E. Blasi and colleagues in 2016. The researchers examined basic vocabulary lists from thousands of languages representing roughly two-thirds of the world's languages and the great majority of language families, and identified seventy-four sound–meaning associations that cannot be explained by chance, among them the association of the concept "small" with the vowel i, of the concept "nose" with the consonant n, and of the concept "tongue" as an organ with the consonant l. That these associations emerge independently of language family and geographical distribution suggests that they arise from shared tendencies of the human mind and body rather than from inheritance from a common ancestor (Blasi et al., 2016, pp. 10818–10820).

Thus, roughly a century after Saussure's principle, modern linguistics has arrived at a more nuanced position that, without rejecting arbitrariness, admits alongside it the existence of natural and universal tendencies linking sound and meaning. This position is remarkably close to the stance of the classical linguists reported by al-Suyūtī, namely that a relationship exists but that it is not necessary.

Common Ground between Ibn Jinnī and Modern Phonosemantics

Notwithstanding the thousand years that separate them, there is considerable common ground between Ibn Jinnī's observations in al-Khasāʾis and the modern phonosemantic research surveyed above. This common ground may be gathered under four points.

First, neither approach regards the relationship between sound and meaning as either absolute arbitrariness or absolute necessity. Ibn Jinnī's explicit admission that his theory is not operative throughout the whole of language, and the refusal of the linguists reported by al-Suyūtī to treat the relationship as necessitating, coincide with the attitude of modern researchers who make room for iconicity and systematicity without rejecting arbitrariness (Dingemanse et al., 2015, p. 603; Ibn Jinnī, 1952–1956, Vol. 2, pp. 138–139; al-Suyūtī, n.d., Vol. 1, p. 47).

Second, both approaches regard cross-modal mapping as the basic mechanism of sound symbolism. Ibn Jinnī's formula of "fashioning the sounds that are heard after the events that are sensed", together with the lax–hard and

moist–dry mapping in the example of khadm and qadm, rests on the same logic as the rounded–spiky mapping in the experiments of Köhler and of Ramachandran and Hubbard (Ibn Jinnī, 1952–1956, Vol. 2, pp. 157–158; Köhler, 1947, pp. 224–225; Ramachandran & Hubbard, 2001, p. 19). Similarly, the assignment of the stronger sound to the stronger meaning in the example of azz and hazz recalls the relation drawn in Ohala's frequency-code hypothesis between the properties of sound and the perception of size and strength (Ibn Jinnī, 1952–1956, Vol. 2, p. 146; Ohala, 1994).

Third, the phenomenon described by Ibn Jinnī in the chapter on quwwat al-lafz li-quwwat al-maʿnā, namely that an addition to the structure of a word indicates an intensification of meaning, is precisely what modern linguistics calls quantitative iconicity. The observation of Dingemanse and colleagues that iconicity is not confined to the imitation of sound by sound but may extend to such other aspects as size, duration and repetition shows that Ibn Jinnī's findings in this area accord directly with the modern framework (Dingemanse et al., 2015, pp. 604–605; Ibn Jinnī, 1952–1956, Vol. 3, pp. 264–268).

Fourth, both approaches relate the question of sound and meaning to the question of the origin of language. Ibn Jinnī's judgement that the view deriving all languages from the imitation of natural sounds is "acceptable", and the conjecture of Ramachandran and Hubbard that the first words may have been founded upon cross-modal mappings, are similar answers given in different ages to the same question (Ibn Jinnī, 1952–1956, Vol. 1, pp. 46–47; Ramachandran & Hubbard, 2001, pp. 19–22).

Differences in Method, Scope and Explanation

Despite this common ground, there are deep differences between the two approaches in method, scope and mode of explanation. Table 2 summarises these differences according to specific criteria.

Table 2. Ibn Jinnī and Modern Phonosemantics Compared

Criterion	**Ibn Jinnī (al-Khasāʾis)**	**Modern phonosemantics**
Unit of analysis	Consonant and unordered root material	Phoneme, phonetic feature, phonaestheme
Data	Attested Arabic words, oral transmission and poetry	Experimental data, large corpora, cross-linguistic vocabulary lists
Method	Induction and interpretation (لطف الصنعة والتأويل)	Experiment, statistical comparison, control groups
Scope of the claim	Partial: not operative throughout the whole of language	Probabilistic: certain associations occur more often than chance
Mode of explanation	The wisdom of the one who assigns and the subtlety of the Arabs	Mental and biological tendencies, ease of learning
Criterion of verification	The persuasiveness of the scholar's interpretation	Statistical significance and replicability

Linguistic scope	Predominantly Arabic	Thousands of languages

As the table indicates, the most fundamental difference lies in method. Ibn Jinnī searches for a common meaning among attested words and extends the meaning he finds to remote usages by way of interpretation. The greatest weakness of this method, as noted above, is that it does not systematically take unsupportive examples into account and that the common meaning, once broadened sufficiently, can be applied to almost any word. Modern research attempts to overcome this weakness by testing statistically whether a sound–meaning association occurs more frequently than would be expected by chance, and the study of Blasi and colleagues constitutes one of the most developed examples of this method (Blasi et al., 2016, pp. 10818–10820).

The second important difference appears in the unit of analysis and especially in the role of consonant order. Ibn Jinnī's theory of al-ishtiqāq al-akbar assumes that meaning attaches to the consonants themselves independently of their arrangement. Modern research, by contrast, shows that the position of a sound within the word matters. The fact that phonaesthemes occur mostly word-initially, and Magnus's finding that the sound–meaning relationship is most marked in word-initial consonants, make it difficult to support with modern data the idea of an order-independent bearing of meaning (Bergen, 2004; Magnus, 2001). In this respect it may be said that there is a tension within the author's own theory between his claim, in the example of bahth (البحث), that the order of the consonants imitates the phases of the event, and his treatment of order as immaterial in al-ishtiqāq al-akbar.

The third difference manifests itself in the mode of explanation. Ibn Jinnī attributes the relationship between sound and meaning to the wisdom of the one who assigns words and to the subtlety of the Arabs in matters of language; this is in essence a teleological explanation. Modern research explains the same phenomenon in terms of shared tendencies of the human mind and body, cross-modal mappings and ease of learning. It is notable that, although Ibn Jinnī presents the relationship between sound and meaning largely as a peculiarity of Arabic, he cites the imitation view that he finds acceptable in relation to the origin of language as applying to "all languages". This second stance accords better with the findings of Blasi and colleagues concerning universal cross-linguistic tendencies.

The assessments above show that the various layers of Ibn Jinnī's theory agree with modern data to differing degrees. While the observations at the level of the consonant and the pattern, in the chapters on imsās and quwwat al-lafz, are strongly supported by modern research on iconicity, the theory of al-ishtiqāq al-akbar at the level of the unordered phonetic material has not yet been tested systematically by modern methods. The theory has nevertheless acquired, for the first time, a testable character. The digitisation of the classical Arabic dictionaries and the development of computational measures of semantic similarity make it possible to test whether the semantic similarity among the six permutations of a root is significantly higher than the semantic similarity among randomly selected groups of triliteral roots. Such a study may be expected to confirm, as Ibn Jinnī himself conceded, that the theory does not hold throughout the whole of language, while also revealing whether significant clustering exists in particular groups of sounds and particular semantic fields. The answer to this question would deepen our understanding of the root structure of Arabic and would also make visible the contribution of the Semitic languages to general phonosemantic research.

A final point should be made about Ibn Jinnī's scholarly attitude. In advancing the theory of al-ishtiqāq al-akbar the author explicitly refrained from extending it to the whole of language and described it as a subtle and demanding path (Ibn Jinnī, 1952–1956, Vol. 2, pp. 138–139). This caution cannot be regarded as an expression of the modern principle of falsifiability; it is nonetheless the mark of a commendable scholarly honesty, in that the limits of a theory are drawn by its own author. Despite al-Suyūtī's criticisms, this attitude requires us to read his theory not as a "law" but as an "opportunity for reflection" directed towards discovering the wisdom of language. Such a reading makes it possible to keep clear both of anachronistic interpretations that would present Ibn Jinnī as a modern phonosemanticist and of reductive ones that would dismiss his work as wholly speculative.

Conclusion

This study has examined the relationship Ibn Jinnī established between sound and meaning in al-Khasāʾis, with the theory of al-ishtiqāq al-akbar at its centre and together with the chapters on imsās al-alfāz, tasāqub al-alfāz and quwwat al-lafz that complement it, and has compared the results with modern phonosemantic approaches. The conclusions reached may be summarised as follows.

First, Ibn Jinnī's theory of sound and meaning unites within a single theoretical framework three distinct legacies that preceded him: al-Khalīl's procedure of permutation and his classification of sounds; the scattered observations of al-Khalīl and Sībawayhi concerning the relationship between sound and meaning; and the debates of the theologians over natural relationship. The author's hesitation on the question of the origin of language freed the theory from attachment to a theological school and turned it into a research programme concerning the internal structure of language.

Second, Ibn Jinnī's theory of sound and meaning is not single-layered. It displays a five-layered structure extending from the phonetic feature of the consonant to the order of the consonants, from pattern and structure to proximity of articulation, and finally to the unordered phonetic material. Of these layers, those at the level of the consonant and the pattern correspond directly to the modern notions of sound symbolism, sequential iconicity and quantitative iconicity, and are largely confirmed by modern experimental findings.

Third, al-ishtiqāq al-akbar, the most ambitious layer of the theory, was criticised in the classical period by scholars such as al-Suyūtī and has remained the layer most difficult to test by modern criteria. The excessive breadth of the common meaning, the dependence of interpretation on the skill of the investigator, and the treatment of consonant order as immaterial have been identified as the principal weaknesses of the theory. Thanks to digitised classical dictionaries and computational measures of semantic similarity, however, it has now become possible to test the theory systematically for the first time. A study along these lines is proposed as a fruitful field for future research.

Fourth, the real difference between Ibn Jinnī and modern phonosemantics lies in method rather than in findings. Ibn Jinnī proceeds by induction and interpretation, modern researchers by experiment and statistics. The point at

which both approaches arrive, however, is the nuanced conviction that there is between sound and meaning neither absolute arbitrariness nor absolute necessity, but rather a tendency of particular sounds towards particular meanings. This conviction can be expressed in almost the same words as the stance of the classical Arabic linguists reported by al-Suyūtī, namely that a relationship exists but that it is not necessitating.

Finally, it should be said that presenting Ibn Jinnī as a modern phonosemanticist is as anachronistic an interpretation as regarding his observations as conjectures unworthy of being weighed in the balance of modern linguistics is unjust. The attention of this exceptional scholar, who a thousand years ago sought the wisdom of language in a single phonetic difference between two words denoting moist and dry food, confronts us once again today in the statistical analysis of thousands of languages. As the proverb cited in the introduction has it, abundance is reached through scarcity and softness through hardness. The rich findings that phonosemantics has attained today have likewise been reached by way of the dry and hard morsels that scholars such as Ibn Jinnī patiently gnawed.

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Blackfoot - Play and Learn: Designing a Game-Based Language Learning Application

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Abstract

Blackfoot (Niitsí'powahsin) is an Indigenous language of the Blackfoot Confederacy that functions as a key medium through which cultural knowledge, identity, and oral traditions are transmitted across generations. Like many Indigenous languages, it faces ongoing endangerment, creating a need for accessible and culturally grounded learning tools that support revitalization efforts. This paper presents Blackfoot - Play and Learn, a web-based, game-driven language learning platform designed to support vocabulary acquisition, contextual understanding, and dialect awareness. The system integrates multiple interactive modules, including flashcards for vocabulary practice, a sentence-based builder for contextual learning, a story-driven listening module for narrative engagement and dialect identification, and a quiz module for self-assessment. A lightweight leaderboard provides motivation through gamified progress tracking. Unlike traditional approaches that assume a standardized language form, the platform incorporates dialect awareness across modules to reflect linguistic variation. Implemented as a modular React-based application with a cloud-backed architecture, the system demonstrates a scalable and maintainable approach to culturally informed, game-based language learning. This work contributes a practical framework for integrating cultural context, dialect variation, and interactive learning in the design of digital tools for endangered language education.

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Introduction

Indigenous languages are widely recognized as carriers of cultural identity, community knowledge, and oral traditions. Their loss results not only in the disappearance of linguistic diversity but also in the erosion of cultural heritage and knowledge systems accumulated over generations (UNESCO, 2022; United Nations, 2018). Blackfoot is an Indigenous language of the Blackfoot Confederacy; it is currently endangered and spoken primarily in southern Alberta, Canada, and northwestern Montana, United States (Zedeño et al., 2021). Like many Indigenous languages, Blackfoot faces challenges related to declining speaker populations, limited accessibility of learning resources, and the need to preserve both linguistic and cultural context.

Recent advancements in digital technologies have created new opportunities for language preservation and learning, including web-based platforms, mobile applications, and multimedia-driven educational tools. However, many existing systems primarily focus on vocabulary memorization or linguistic documentation, often lacking contextual learning, dialect awareness, and culturally grounded interaction. In the case of Blackfoot, where multiple dialects exist and oral traditions play a central role, learning tools must go beyond static representations to incorporate narrative context, pronunciation, and variation across communities.

This paper presents Blackfoot - Play and Learn, a modular, game-based web application designed to support language learning through interactive practice and cultural engagement. The system integrates multiple learning modules, including flashcard-based vocabulary practice, sentence-building activities for contextual understanding, story-based listening with dialect identification, and quiz-based reinforcement. In alignment with the goals of the United Nations International Decade of Indigenous Languages (2022-2032), the platform aims to provide an accessible and culturally informed learning environment that supports community-driven language revitalization efforts (UNESCO, n.d.).

Background

Indigenous languages are important because they encode community-specific ways of knowing and relating to the world, including governance systems, laws, and place-based knowledge that are often difficult to translate into dominant languages. Chiblow and Meighan (2022) describe Indigenous languages as ecological knowledge systems and ancestral guides that carry generations of cultural and environmental understanding, and emphasize that language loss results in the erosion of this knowledge. They further highlight the scale of language endangerment driven by colonial policies, noting estimates that one Indigenous language is lost approximately every two weeks, with this decline closely linked to processes of colonization, assimilation, and dispossession.

Blackfoot (Niitsí’powahsin), a member of the Algonquian language family, is spoken within Blackfoot communities in southern Alberta, Canada, and northwestern Montana, United States, and is widely described as endangered (Miyashita & Fish, 2019; UNESCO, 2022). The language comprises three primary dialects - Siksiká, Káínai, and Piikani (including both Northern and Southern Piegan variants), which are mutually intelligible but exhibit differences in pronunciation and lexical usage (Miyashita & Chatsis, 2015; Zedeño et al., 2021). The

language is characterized by a limited and aging base of fluent speakers in many contexts, increasing the urgency for accessible learning and documentation resources. Estimates of speaker population vary across sources and methodologies: some studies report approximately 3,000–3,250 speakers in Canada and fewer than 50 in the United States, indicating critically low speaker numbers in certain regions (Genee, 2021), while more recent research suggests broader estimates ranging from approximately 3,000 to 5,000 speakers, with fluency concentrated among older generations (Ethnologue, n.d.; Weber, 2023). This demographic trend highlights the need for learning tools that are accessible, culturally grounded, and adaptable to diverse learner contexts, particularly for supporting intergenerational language transmission (UNESCO, n.d.).

Related Work

Existing efforts in Blackfoot language preservation span digital documentation, reference tools, and community-oriented learning resources. Digital infrastructures such as the Blackfoot Language Resources and Digital Dictionary and the Blackfoot Words database provide extensive lexical data, multimedia support, and representation of dialectal variation (Blackfoot Language Resources, 2026; Genee, 2021; Weber, 2023). While these systems significantly enhance documentation and accessibility, they primarily function as repositories and do not provide structured, interactive learning experiences for learners.

Language learning is also supported through mobile and web-based applications developed by educational and community institutions. Platforms such as the Blackfoot and Blackfoot Community College apps, as well as Piikani Paitapiiyssin, provide vocabulary, audio, and cultural content (Google Play, 2023; Old Sun Community College, 2026; Piikani Cultural and Family Services, 2025). In addition, MeTILDA supports pronunciation learning and linguistic analysis through pitch visualization (Lee et al., 2021; University of Montana, n.d.). However, these systems generally emphasize content access or specific learning aspects (e.g., pronunciation) rather than integrated, practice-oriented learning environments. Furthermore, widely used mainstream platforms such as Duolingo offer strong gamified engagement but do not include Blackfoot content, limiting their applicability (Duolingo, n.d.).

Prior research also highlights the importance of dialect variation in Blackfoot, where multiple dialects exhibit differences in vocabulary and pronunciation that impact both instruction and learning consistency (Encyclopaedia Britannica, 2025; Weber, 2023). In parallel, studies on gamification indicate that while features such as quizzes, flashcards, and leaderboards can improve engagement and learning outcomes, their effectiveness depends on integration with meaningful learning tasks (Luo et al., 2023; Oller, 1979; Özdemir & Seçkin, 2024; Shortt et al., 2023; Xodabande et al., 2022). However, existing Blackfoot learning tools rarely combine structured practice, gamification, and explicit dialect awareness within a unified system.

These limitations reveal a key gap: the need for an integrated, learner-facing platform that combines interactive practice, gamified engagement, and dialect-aware design. This gap is addressed by Blackfoot–Play and Learn, which integrates modular learning activities with explicit dialect support and culturally grounded content.

System Design

The proposed system is designed as a web-based educational platform that integrates interactive learning modules with a scalable, cloud-based architecture. The design emphasizes modularity, extensibility, and alignment with both pedagogical and cultural requirements.

As shown in Figure 1, the system follows a client-driven architecture in which the frontend manages user interaction and application logic, while backend services are provided through managed cloud infrastructure. This approach reduces operational complexity while supporting real-time data access and scalability.

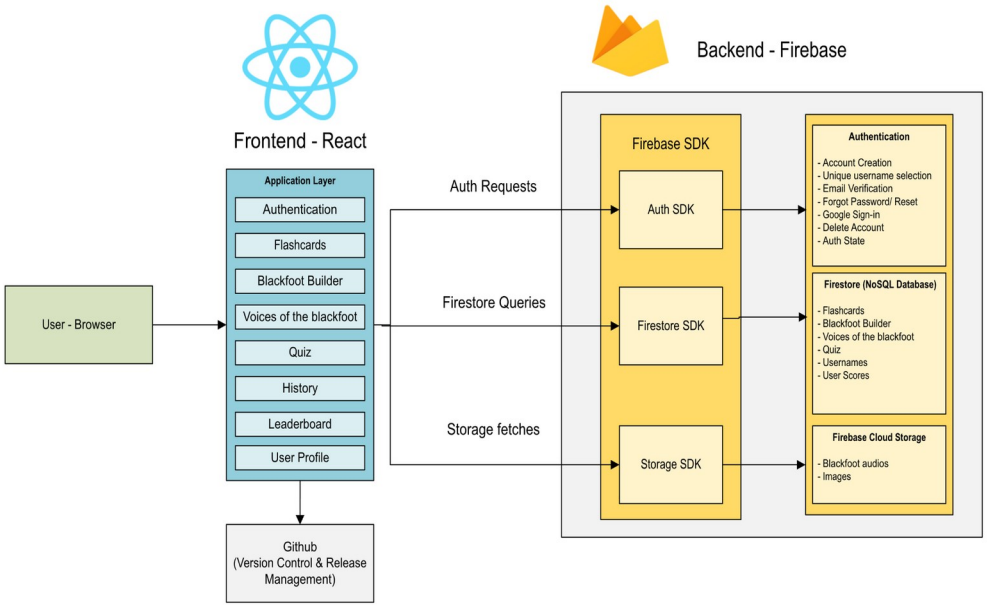


Figure 1. System Architecture

The application is organized into multiple learning modules, each targeting a specific aspect of language acquisition. The Flashcards module supports vocabulary learning through repeated exposure and retrieval. The Blackfoot Builder module provides sentence-based practice through guided word selection, enabling learners to construct meaning in context. The Voices of the Blackfoot module focuses on listening comprehension and dialect identification by presenting narrative audio recordings and requiring learners to identify the dialect represented. The Quiz module reinforces knowledge through structured multiple-choice questions related to language and culture.

A leaderboard system is integrated to provide a lightweight gamification layer, encouraging continued engagement and making user progress visible. Unlike purely competitive systems, the design aims to balance motivation with cultural sensitivity.

A key design feature of the system is its dialect-aware architecture. Rather than treating Blackfoot as a single standardized language, the system incorporates dialect as an explicit parameter across modules. Content is

organized and filtered based on dialect selection, ensuring consistency in vocabulary, pronunciation, and learning context. This approach reduces learner confusion and aligns with community-specific language use.

Authentication and User Management Subsystem

The authentication subsystem manages user identity, session control, and access restrictions across the application. Authentication is implemented using Firebase Authentication, supporting both email/password and Google-based sign-in methods as shown in Figure 2. Upon successful login, authenticated users are granted access to protected application features, while unauthenticated users are redirected to the login interface as depicted in Figure 3.

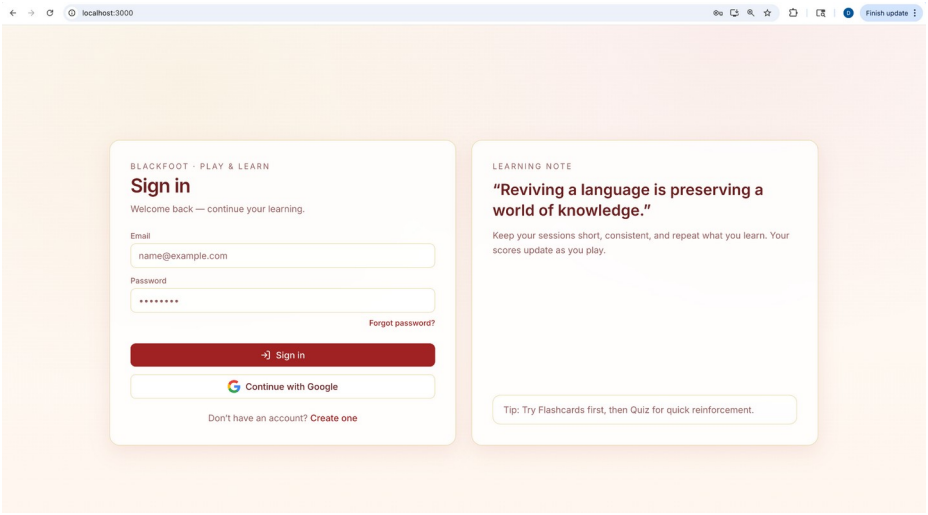


Figure 2. Login View

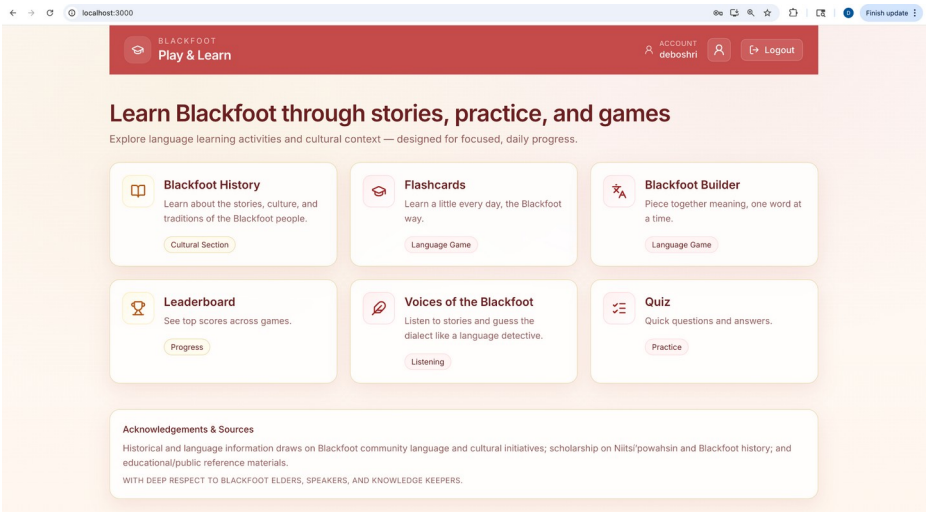


Figure 3. Home View

To ensure controlled access, the system enforces route-level protection, restricting entry to authenticated users only. In addition, a verification mechanism is applied to password-based accounts, requiring users to complete email verification before accessing core functionality. This approach ensures that only verified users interact with

the system while maintaining a seamless user experience.

User identity is represented through unique identifiers and linked to corresponding records in the database. These records store user-related information such as profile data and cumulative scores, enabling consistent tracking of user activity across all learning modules.

Flashcards Subsystem

The Flashcards subsystem supports vocabulary acquisition through structured and repeated exposure to lexical items and retrieval practice. Learning content is organized into themes, each representing a semantic category such as animals, days of the week, or cultural elements. Users interact with word-meaning pairs presented sequentially, enabling reinforcement through repeated retrieval.

The subsystem follows a data-driven design, with flashcard content dynamically loaded from the database rather than hardcoded. This allows new vocabulary sets to be added without requiring changes to application logic. The Flashcards module presents vocabulary using a front-and-back interaction model, where the prompt and its corresponding translation are shown on opposite sides, as depicted in Figure 4. The design emphasizes incremental learning and recall, which are widely recognized as effective strategies for vocabulary acquisition.

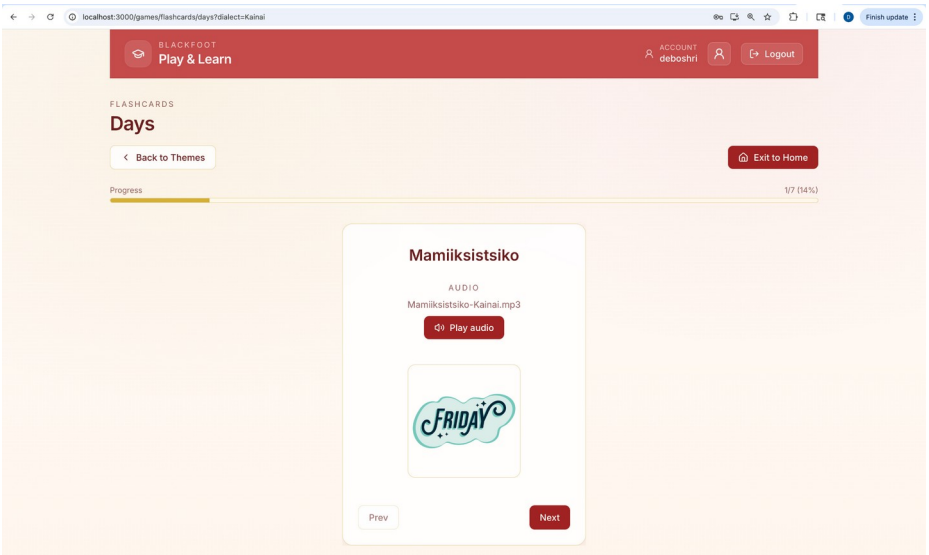


Figure 4. Flashcards - Back View

Blackfoot Builder Subsystem

The Blackfoot Builder subsystem focuses on sentence-level learning by enabling users to construct meaningful phrases through guided interaction. Instead of memorizing isolated vocabulary, users engage with contextualized language by selecting appropriate words to complete partially structured sentences.

Content is organized into themed sentence sets, allowing learners to practice within specific contexts. Figure 5

illustrates the blackfoot builder game view that validates user input and provides immediate feedback, reinforcing correct usage and enabling iterative learning. This approach supports both comprehension and productive language skills by encouraging learners to actively construct meaning rather than passively consume content.

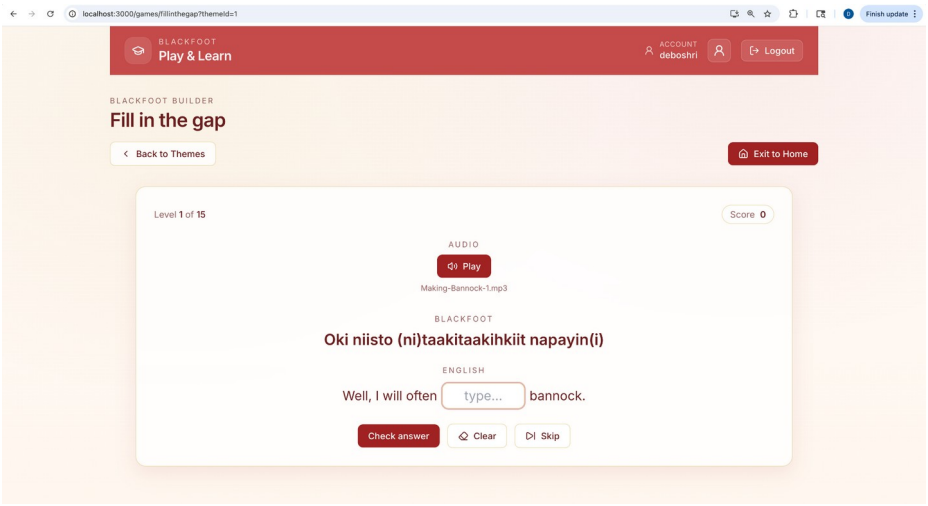


Figure 5. Blackfoot Builder - Game View

Voices of the Blackfoot Subsystem

The Voices of the Blackfoot subsystem is designed to support listening comprehension and dialect differentiation. As shown in Figure 6, the module presents users with audio recordings of narratives and stories sourced from Blackfoot communities, accompanied by corresponding English translations.

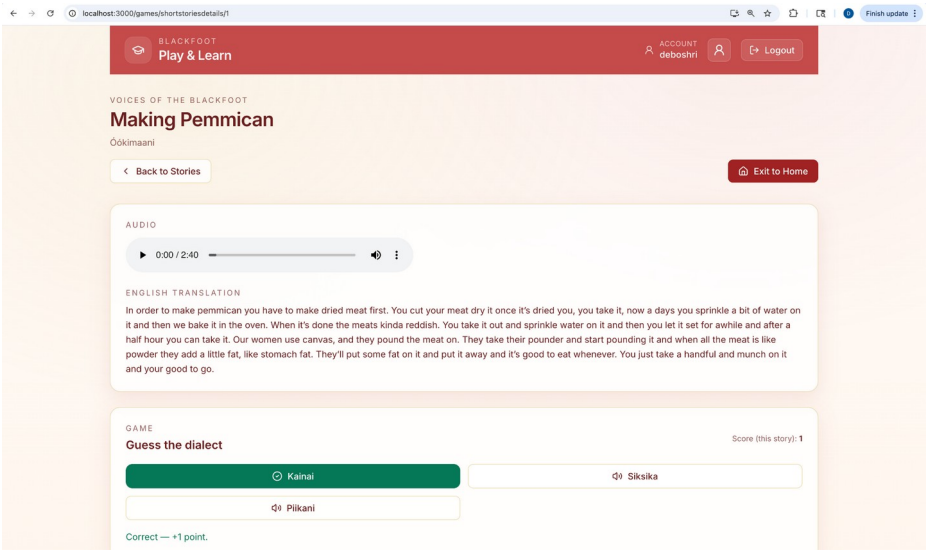


Figure 6. Voices of the Blackfoot - Game View

Users are required to identify the dialect represented in each recording, transforming dialect recognition into an interactive learning task. This design exposes learners to authentic linguistic variation while reinforcing awareness of dialectal differences. By integrating narrative content, the subsystem also supports cultural learning, providing

exposure to community-based knowledge and storytelling traditions.

Quiz Subsystem

The Quiz subsystem provides structured assessment through multiple-choice questions related to language, culture, and everyday life. The module is designed to reinforce previously learned concepts and enable users to evaluate their understanding.

Questions are dynamically loaded from the database, allowing content to be expanded without modifying application logic. Upon completion, the Quiz module presents a summary view that aggregates user performance metrics, including score and answer correctness, as illustrated in Figure 7. The quiz structure encourages rapid recall and helps consolidate knowledge gained through other modules.

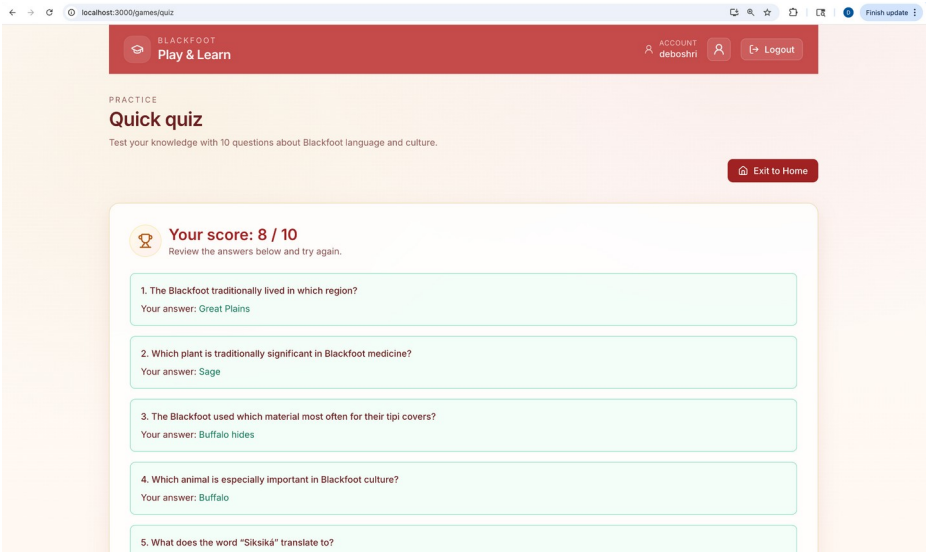


Figure 7. Quiz - Summary View

Content and Data Management Subsystem

The content and data management subsystem is responsible for storing, organizing, and retrieving all application data, including learning content and user information. Cloud Firestore serves as the primary data store, providing a flexible and scalable structure for managing application data.

Learning content is organized in a modular, hierarchical format, where themes and modules act as containers for vocabulary items, sentences, stories, and quiz questions. This structure allows new content to be added without requiring changes to application logic, supporting long-term scalability.

In addition to structured data, media assets such as audio recordings are stored separately using Firebase Storage. This separation ensures efficient handling of both structured and unstructured data while maintaining lightweight

database operations.

Leaderboard Subsystem

The Leaderboard subsystem provides a mechanism for tracking and displaying user performance across learning modules. Scores accumulated through user interactions are aggregated and presented in a ranked format, allowing users to compare their progress relative to others.

The subsystem serves as a lightweight gamification layer, encouraging continued engagement and participation. By making progress visible, it reinforces motivation while maintaining a simple and non-intrusive design that supports learning objectives.

History Subsystem

The History view provides contextual and cultural grounding to complement the interactive learning modules by presenting structured information about Blackfoot history, language, and community knowledge. Unlike practice-based modules, it is designed to support background understanding rather than user-driven interaction or performance tracking.

The module is implemented as a client-side React view that renders pre-authored content organized into thematic sections and a chronological timeline. Content is stored in structured data objects and dynamically rendered through reusable components, enabling clear separation between content and presentation logic and supporting maintainability. The inclusion of a timeline-based representation allows learners to understand key historical developments in a sequential manner, improving comprehension of the broader cultural context.

User Profile Subsystem

The User Profile subsystem manages user-specific information and supports account-related functionality within the application. Each user is associated with a unique profile that stores identifying information and cumulative progress data.

The subsystem enables users to manage their account details and provides a centralized view of their activity within the platform. By maintaining persistent user records, it supports consistent tracking of performance across different learning modules.

Dialect-Aware Content Design

A key design consideration of the system is its explicit support for dialect variation. Blackfoot is not treated as a single standardized language; instead, dialect is incorporated as a fundamental aspect of content organization and learning.

Content is structured and presented based on dialect, ensuring consistency in vocabulary, pronunciation, and instructional context. In certain modules, dialect awareness is integrated directly into the learning experience, requiring users to recognize and differentiate between dialects.

This approach reduces confusion caused by mixed dialect exposure and aligns the system with community-specific language use and educational practices.

Experimental and Analysis

Accessibility, Best Practice, and SEO Evaluation

The accessibility, best practice, and SEO evaluations were conducted using Google Lighthouse, an automated auditing tool for assessing web application quality. The accessibility audit evaluates usability aspects such as color contrast, semantic structure, and compatibility with assistive technologies. The best practice audit verifies adherence to modern web development standards, including secure resource usage and proper implementation of web APIs, while the SEO audit assesses structural correctness and discoverability of the application.

Table 1 presents the evaluation results across major subsystems, including Authentication, Flashcards, Blackfoot Builder, Voices of the Blackfoot, Quiz, Leaderboard, and History. The evaluation was conducted on the primary interaction pages of each module to reflect realistic usage conditions.

Table 1. Accessibility, Best Practices and SEO Test Scores

Subsystem	Accessibility	Best Practices	SEO
Authentication	97	100	100
Flashcards	94	100	100
Blackfoot Builder	92	100	100
Voices of the Blackfoot	92	100	100
Quiz	93	100	100
Leaderboard	90	100	100
History	95	100	100

The results indicate consistently high scores across all subsystems, with strong accessibility compliance and perfect adherence to best practices and SEO standards. These results demonstrate that the system provides a user-friendly, standards-compliant, and well-structured interface across all interactive modules.

Functional and Integration Testing

To ensure the correctness and reliability of the application, a structured testing strategy was employed, consisting of both functional and integration testing. These tests were implemented using Jest and the React Testing Library, enabling simulation of user interactions and validation of system behavior against expected outcomes.

Functional testing was conducted to evaluate the behavior of individual components, application views, and core logic in isolation. As summarized in Table 2, the functional test suite covered key areas including authentication and onboarding workflows, interactive learning modules, core application views, and utility-level business logic. Authentication tests validated login rendering, email verification handling, and username selection, including normalization and conflict resolution. The interactive learning modules were tested to ensure correct rendering, state transitions, input handling, and scoring behavior. In addition, core application views were verified to render correctly. Utility and business logic functions, including database transaction wrappers and validation routines, were tested independently to ensure correctness and data integrity.

Table 2. Summary of Functional and Integration Testing Scope

Testing Phase	Category / Module	Testing Scope & Objectives	Test Count	Result
Functional	Authentication & Onboarding	Validates login form rendering, email verification handling, and the username selection form (input normalization, conflict handling, and error rendering).	15	100% Passed
Functional	Interactive Learning Games	Verifies the rendering and interactive state logic of educational modules: Quiz, Flashcards, Fill-in-the-Gap, and Short Stories.	25	100% Passed
Functional	Core Application Views	Ensures correct rendering of primary user interfaces, including the Navbar, Home dashboard, History, and Leaderboard components.	15	100% Passed
Functional	Utilities & Business Logic	Tests pure functions and database transaction wrappers (e.g., username validation, format normalization) to guarantee data integrity.	15	100% Passed

Integration	Application Routing	Verifies the structural integrity of the React Router configuration, ensuring all 8 primary application paths render their respective components without crashing.	8	100% Passed
Integration	Access Control (Auth Gating)	Validates root-level application state changes based on simulated Firebase authentication events (protecting private routes).	2	100% Passed

Integration testing was performed to evaluate system-level behavior and interactions between modules within the complete application. These tests focused on validating routing configuration and authentication-based access control. Routing tests ensured that all primary application paths correctly map to their corresponding components and render without failure. Authentication gating tests verified that application state transitions based on user authentication are correctly enforced, ensuring that unauthorized users are restricted from accessing protected routes while authenticated users are granted appropriate access.

Overall, the results demonstrate that the system maintains correct functional behavior at both the module level and the application level, providing confidence in the stability and reliability of the implemented architecture.

Code Coverage Analysis

Code coverage analysis was performed to quantify the extent to which the implemented test suite exercises the application logic. Coverage was measured across statements, branches, functions, and lines using the automated testing pipeline integrated with the React testing framework.

Table 3 summarizes the coverage results. Code coverage analysis indicates strong test coverage across the implemented codebase, with over 80% statement, function, and line coverage, and 68.18% branch coverage. These results suggest that the automated test suite exercises the majority of core application logic and interaction paths, providing substantial evidence of system correctness and reliability.

The test suite consists of a total of 80 test cases across 24 test suites, including 70 unit tests and 10 integration tests. Unit tests primarily target individual components, game logic, and utility functions, ensuring correctness of isolated behaviors such as answer validation, scoring, and authentication logic. Integration tests focus on route-level behavior and application flow, validating interactions between modules and enforcing authentication-based access control.

Overall, the coverage results demonstrate that the core functional paths of the application, including interactive learning modules and supporting logic, are well exercised by the test suite. This provides strong evidence of

system reliability and correctness, particularly for user-facing workflows and critical application behaviors.

Table 3. Code Coverage and Test Summary

Testing Metric	Count / Percentage	Description
Statement Coverage	80.85%	Percentage of executable statements that have been executed.
Branch Coverage	68.18%	Percentage of executed control flow branches (e.g., if/else statements).
Function Coverage	83.44%	Percentage of defined functions that have been called during testing.
Line Coverage	83.49%	Percentage of executable lines of code covered by tests.
Total Tests	80 Tests	Total combined test cases passing successfully.
Unit Tests	70 tests (22 Suites)	Tests isolated to specific components, games, and utility functions.
Integration Tests	10 tests (2 Suites)	Tests verifying route rendering and app authentication flows.

Conclusions

This paper presented Blackfoot – Play and Learn, a web-based, modular, and dialect-aware language-learning platform designed to support the preservation and accessibility of the Blackfoot language. The system integrates multiple interactive learning modules, including vocabulary reinforcement, sentence-based practice, listening-centered dialect identification, and quiz-based assessment, within a unified and scalable architecture. By combining structured learning with lightweight gamification, the platform enhances user engagement while maintaining a focus on meaningful language acquisition.

A key contribution of this work is the incorporation of dialect awareness as a fundamental design element, ensuring consistency in vocabulary, pronunciation, and learning context across modules. This approach addresses a critical limitation in prior systems, where dialect variation is often overlooked, leading to potential confusion among learners. In addition, the system demonstrates strong software engineering practices through its modular design, data-driven content management, and integration of cloud-based services.

The results indicate that the platform provides a maintainable and extensible foundation for interactive and culturally informed language learning. By bridging the gap between language documentation and practical

learning tools, the system contributes to ongoing efforts in Indigenous language revitalization. Future work may extend the platform through adaptive learning mechanisms, expanded content authoring capabilities, and integration with classroom-based educational environments, further enhancing its impact and usability.

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Building Workplace Resilience: A Scoping Review of Professional Competencies

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Abstract

Resilience is known as an essential determinant of sustainable workplace performance (Hao et al., 2025; Wut et al., 2022). This scoping review synthesizes research examining the intersection of resilience, employee engagement, and adaptability in the workplace. Evidence from research indicates that resilience is positively correlated with reduced burnout, job satisfaction, and work engagement, especially in stressful work environments/settings (Mazzetti et al., 2024). Organizational structures and human resource practices further strengthen resilience and long-term productivity among employees (Hao et al., 2025; Lu et al., 2023; Trunk Širca et al., 2024). To foster sustained performance and career longevity, emerging research findings position intentional self-regulation and reflective self-care practices as proactive competencies in professionals rather than reactive or responsive coping strategies (Caza & Milton, 2012; Galy et al., 2023). In this session, the presenter will address suggestions for how educators can embed resilience-building frameworks into workforce preparation.

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Introduction

In the 1990s, one psychologist described resilience in terms of "good developmental outcomes despite high-risk status; sustained competence under stress; and recovery from trauma" (Werner, 1995, p. 81). Elsewhere, it is defined as the capacity for people to not only successfully/positively adapt but also recover and thrive when adversity strikes (American Psychological Association, n.d.; Luthar, 2006). Many refer to this as 'bouncing back' from challenges or difficulties. According to East Lancashire Hospitals NHS Trust (2025), the pillars of individual resilience are confidence, social support, adaptability, and purposefulness, and they are described below:

Confidence: Having competence and a healthy self-esteem that empowers you to believe you can cope effectively when stress arises.
Social support: Possessing the ability to understand the importance of building strong relationships and seeking support are essential for coping.
Adaptability: Having the skills to be flexible and be able to adjust to changing circumstances, particularly when they are beyond your control.
Purposefulness: Possessing drive, a sense of direction, and well-defined values.

Resilience in the workplace is described as the ability to adapt, recover from, and thrive in response to work-related challenges (Craig, 2019). Also, according to East Lancashire Hospitals NHS Trust (2025), resilience in the workplace includes four key components, namely, purpose, perspective, control, and connection, and these are described as:

Purpose: Possessing a clear sense of both meaning and direction, accompanied by feeling that your role as an employee is meaningful to the organization
Perspective: Having the capacity to reframe challenges and maintain a balanced outlook as when things are beyond your control
Control: Possessing the ability to focus on what's within your control
Connection: Having the skills to build trusting, positive relationships at work.

Based on observations as an employee, I believe that due to increasing uncertainty and ambiguity in workplaces, resilience in the workplace is crucial for both individual and organizational success. Research suggests that resilience at the individual and organizational levels intersect with employees' engagement and adaptability for sustainable performance (Alijuaid, 2025; Biswas, 2025; Lengnick-Hall et al., 2011; Trunk Širca et al., 2024).

Methods

I conducted my review following three major steps from Mak and Thomas (2022) framework: 1. Identify relevant studies, 2. Select studies to be included to provide, and 3. Summarize/synthesize the studies. The databases I searched included Google-Scholar, Scribendi, SSRN, PubMed, PsycINFO, and Scopus. Keywords included 'resilience,' 'workplace resilience,' 'employee engagement,' 'adaptability,' and 'professional competencies.'

Inclusion criteria focused on peer reviewed studies, meta-analyses, and reviews published in English addressing resilience in workplace/professional contexts. I excluded purely clinical or student-only samples, unless they were linked to transitioning to the workplace. A total of 32 records were screened with a total of 17 sources being retained for synthesis.

Consequently, this paper is a synthesis of research examining the intersection of resilience, employee engagement, and adaptability in the workplace organized into the extracted themes from existing literature as follows; resilience, engagement, adaptability, and performance, organizational structures and Human Resources practices and resilience, Proactive professional competencies. After the themes follows a discussion, limitations and future research, and implications for educators and workforce preparation.

Theme 1: Resilience, Adaptability, Engagement, and Performance

There is a consistent connection between resilience and performance outcomes at work. According to Wut et al.'s (2022), research in which they surveyed 115 employees from "financial, retail, medical, logistics, hospitality, and education industries," (p. 5) both psychological and organizational resilience positively influence perceived employee resilience and well-being, thereby contributing to continued performance during crises at work. In general, when crises happen at work, performance will suffer, but Wut et al. posit that when both employees and organizations are resilient, job performance doesn't cease during those times. In a meta-analysis of 279 studies, Good et al. (2025) found that resilience at the individual level is positively correlated with psychological and physical well-being, job performance and attitudes related to the job. In other words, individuals with higher levels of resilience tend to do well in terms of their health and on the job.

In high-stress environments, resilience acts as a buffer against negative effects. Mazzetti et al.'s (2025) research with healthcare professionals produced evidence that resilience supports engagement at work while reducing the impact of job-related challenges and emotional exhaustion. These results align with both Good et al.'s (2025) and Wut et al.'s (2022) research, in which they also found a link between resilience and positive health outcomes. Mazzetti et al.'s (2025) findings convey hope for and among professionals because emotional exhaustion is a key contributor to burnout. So, if resilience moderates negative outcomes, the risk of professionals eventually experiencing burnout lessens. These correlations appear to be generalizable across occupational settings, considering that this research had participants from a variety of professions.

Theme 2: Organizational Structures and Human Resources Practices and Resilience

Workplace/organizational structures and human resources policies contribute to individual resilience. Hao et al. (2025) found that when there is shared governance/leadership, the impact on employee resilience is double-edged because while there is increased motivation, there is also increased role strain unless the organization outlines clear goals. Policies that emphasize flexibility, collective interest, and supporting employee well-being tend to improve employee resilience, thereby creating more employee engagement and better performance (Hao et al., 2025; Lu et al., 2023; Trunk Širca et al., 2024). So, while employees might want to be involved in leadership

decisions and such, organizations must ensure that their employees don't end up unnecessarily burdened as part of shared governance/leadership. Additionally, organizations must ensure that their policies are employee-friendly (Trunk Širca et al., 2024).

Scheuch et al.'s (2021) work on resilience training programs showed that resilience training programs improve employee well-being and resilience as well as work performance. Their research also showed that these training programs are mostly based on cognitive behavioral interventions and mindfulness principles. From an evaluation standpoint, we must not forget that program effectiveness is heavily dependent on how well the program is designed to start with and whether it's a good fit for the organization's vision and mission. According to Hartwig et al. (2020), at a larger scale, workplace team resilience results from practices such as trust, social support, communication, and unity. Once the team has resilience, it enables them to positively adapt and maintain performance even when facing adversity. In other words, while an individual must be resilient to succeed at work, all employees must also be resilient if the organization is to thrive.

Theme 3: Proactive Professional Competencies

Traditionally, resilience involves reactively coping in response to stressors after they occur. Emerging research positions resilience as a proactive trait that helps people not only endure stressors but also anticipate, prevent, and hopefully grow from those experiences. Intentional self-regulation and reflective self-care are competencies that help the reframing from reactive to proactive when it comes to resilience (Caza & Milton, 2012; Galy et al., 2023).

Intentional Self-Regulation

Intentional self-regulation is described as "people's modulation of their thoughts, attention, emotions, and behaviors to react to environmental demands and to influence their own development," (Gestsdottir et al., 2009, p. 585). This entails strategies such as those listed below:

Impulse control practices
Cognitive reappraisal
Goal setting and planning habits
Proactive stress anticipation
Self-compassion
Growth mindset (Gestsdottir et al., 2009).

According to de la Fuente et al. (2022), being proactive is aligned with self-regulatory behaviors, which are necessary for people to do well in life.

Reflective Self-Care

Reflective self-care is when individuals deliberately introspect when practicing self-care to create long-term

capacity personally or professionally (Caza & Milton, 2012; Schön, 1983). It encompasses strategies listed below:

Reflective journaling (Schön, 1983)
Structured debriefing (Posluns & Gall, 2019)
Mindfulness (Bartlett et al., 2019; D'Antoni et al., 2025; KabatZinn, 1994; Vainre et al., 2025; VásquezCarrasco et al., 2026--)
Boundary setting (Posluns & Gall, 2019)
Values clarification (Sherman & Cohen, 2006)
Self-affirmation exercises (Sherman & Cohen, 2006).

These competencies are crucial because they equip people with tools to help them anticipate the future from a proactive standpoint instead of reactively reaching for them during crises. Professionals can individually integrate the strategies above daily or weekly depending on their schedules, and organizations can support their employees as they practice these strategies to maximize employee wellness, thus resulting in optimal performance at work.

It's worth mentioning that educators play a pivotal role in introducing students to resilience and hopefully cultivating a resilience mindset as they work with future professionals. Recommendations include (but are not limited to):

Integrating training in self-regulation and reflective self-care as curricula or classes permit
Including case studies to prepare for real-world experience
Incorporating scenario-based simulations
Assigning self-assessments that gauge different skills like setting boundaries
Collaborating with organizations for experiential learning opportunities.

So, workforce preparation programs should adopt a whole-person approach, transitioning from deficit-focused stress management to strength-based proactive development. This aligns with calls for resilience as a key 21st-century professional competency (Matczak, 2024).

Discussion

The synthesized evidence from existing literature confirms that resilience is vital for employee success and that workplace resilience is dependent upon individual resilience. There is robust empirical evidence showing the positive correlation between resilience and personal and professional outcomes such as physical and psychological well-being at the personal level; and attitudes and job performance at the professional level (Good et al., 2025; Mazzetti et al., 2025; Wut et al., 2022). In addition, research has shown that resilience prevents emotional exhaustion (Mazzetti et al., 2025). Hao et al. (2025) highlighted how shared governance/leadership can enhance resilience among employees, but it also increases work overload if an organization lacks supportive structures.

Human Resources practices are essential in facilitating the translation of individual competencies into collective

resilience and productivity for organizations. There are two competencies (intentional self-regulation and reflective self-care) proposed for reframing resilience as proactive, not reactive (Caza & Milton, 2012; Galy et al., 2023). Gestsdottir et al. (2009) suggested impulse control practices, cognitive reappraisal, goal setting and planning habits, proactive stress anticipation, self-compassion, and growth as part of practicing intentional self-regulation. The literature proposed reflective journaling (Schön, 1983), structured debriefing (Posluns & Gall, 2019), mindfulness (Bartlett et al., 2019; D'Antoni et al., 2025; KabatZinn, 1994; Vainre et al., 2025; VásquezCarrasco et al., 2026--), boundary setting (Posluns & Gall, 2019), values clarification (Sherman & Cohen, 2006), and self-affirmation exercises (Sherman & Cohen, 2006) as helpful strategies to practice reflective self-care.

Limitations and Future Research

Regardless of these hopeful findings from existing literature, several gaps and limitations must be addressed. First, the broad inclusion criteria and focus on English publications from 2020 to 2025 overlooks non-Western perspectives. Consequently, generalizability across cultural contexts is limited. Second, there is limited longitudinal research since most of the identified and included literature was cross-sectional and short term. Along the same lines, there is a shortage of research tracking the sustained impact of proactive competencies versus reactive strategies among professionals. Fourth, there are persistent measurement inconsistencies with resilience variably described as a trait/quality, a process/journey, or an outcome/result. When there are such differences in defining a variable, it makes it difficult to compare studies or evaluate the effectiveness of interventions. Fifth, from the reviewed literature, a few studies showed a correlation between self-regulation and reflective self-care, underscoring the need for more rigorous research on the topic in various settings/workplaces. Finally, the evidence base is further constrained by a lack of mixed methods research.

Based on these gaps, there is a need for further exploration as follows: 1. Pursuing cross-cultural validations of proactive competencies, 2. Developing standardized measurement tools to assess professional resilience competencies, 3. Focusing on other sectors missing from the included literature, 4. Conducting randomized controlled trials evaluating proposed interventions, 5. Investigating the cost-effectiveness of proactive competency training, and 6. Researching the extent to which emerging technologies like AI can support or hinder resilience. These advancements would bolster the evidence base suggesting that resilience is possible for everyone both personally and professionally.

In conclusion, this scoping review highlights that building resilience in the workplace requires a holistic approach aimed at equipping people with proactive tools while reforming organizations/workplaces to not only provide, but nurture proactivity. When organizations/workplaces equip people with tools to succeed and the freedom to act, people do better both in the short and long term, benefiting both the individual and the organization.

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Artificial Intelligence and Mobile Health Interventions for Alcohol Misuse among College Students: Prevention, Prediction, and Implementation Challenges

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Abstract

Alcohol misuse among college students remains a significant public health concern, often associated with academic decline, behavioral risks, and long-term health implications. Emerging digital technologies, including mobile health applications, web-based feedback systems, and machine learning (ML) models, offer innovative strategies to address this challenge in higher education. This review synthesized findings from seven peer-reviewed studies published between 2021 and 2025 that examined technology-based interventions to reduce alcohol use among university populations. A comprehensive search was conducted across EBSCOhost, ERIC (Education Resources Information Center), PubMed, PsycINFO, ScienceDirect, and Scopus, with additional studies identified through Google Scholar. The reviewed evidence indicated that smartphone- and web-based interventions that use personalized feedback, behavioral monitoring, and motivational messaging effectively support harm reduction and enhance self-regulation. ML models contributed to identifying patterns of risky drinking and guiding timely, preventive feedback. Despite these advances, challenges related to user engagement, ethical considerations, and institutional implementation persist. Overall, technology-driven interventions represent scalable, adaptive, and cost-effective approaches to promoting healthier behaviors among college students.

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Introduction

Alcohol abuse, broadly defined as the excessive and harmful consumption of alcoholic beverages, remains a pervasive public health concern, particularly among young adults (Bae et al., 2023). In clinical and public health contexts, binge drinking is defined as consuming five or more drinks for men, or four or more drinks for women, within about two hours (Bae et al., 2023). This elevated rate of alcohol misuse on college campuses contributes to a range of serious consequences, including academic decline, blackouts, assault, injury, and long-term addiction risks (Chow et al., 2025). The convergence of developmental vulnerability and high social alcohol exposure makes U.S. college students a particularly at-risk population for alcohol abuse, as national data indicate that 78% of college students report drinking alcohol annually, 62% within the past month, and 32% engage in heavy episodic drinking (Pedersen et al., 2022).

Alcohol Abuse among College Students: Causes and Consequences

College students are particularly vulnerable to alcohol misuse due to a combination of developmental and social factors. The transition to college often brings increased independence and exposure to peer and environmental influences, which elevate the likelihood of risky drinking behaviors (Pedersen et al., 2022). Chow et al. (2025) further emphasized that binge drinking is highly prevalent among U.S. college students and is associated with serious short- and long-term consequences, including lower academic performance, increased risk of sexual assault, drunk driving, and long-term health complications. The authors noted that college students consume more alcohol than their non-college-attending peers, highlighting the critical need for targeted prevention efforts on campuses. The consequences of alcohol abuse among college students are both immediate and long-term. Short-term effects include academic decline, memory blackouts, risky sexual behavior, accidents, injuries, and even death from alcohol poisoning or impaired driving (Bertholet et al., 2023; Chow et al., 2025). As Bertholet et al. (2023) noted, students' alcohol use is associated with physical, behavioral, emotional, and relational consequences, as well as academic impairment and institutional costs. Furthermore, heavy drinking episodes increase the risk of injuries, violence, suicide, and mortality. Long-term consequences may include the development of alcohol use disorder (AUD), mental health problems, and diminished future prospects due to legal or academic disciplinary actions (Eme et al., 2024).

Technology-Based Strategies for Preventing Alcohol Abuse Among College Students

Advancements in digital health technology offer innovative solutions to tackle alcohol misuse in college settings. For instance, Fucito et al. (2025) demonstrated that a multimodal intervention integrating wearable feedback, smartphone self-monitoring, and virtual coaching improved alcohol-related outcomes and sleep health among young adults engaged in at-risk drinking. Evidence shows that eHealth and mobile-based interventions can effectively reduce alcohol consumption among university students, with web-based personalized feedback and computerized programs demonstrating small but significant reductions in weekly alcohol intake (McDermott et al., 2023). Recent advances in wearable and AI-assisted monitoring systems have expanded the scope of digital alcohol-reduction strategies. McDermott et al. (2023) noted that mobile health and real-time tracking technologies,

such as smartwatch-based platforms with accelerometers, gyroscopes, heart rate sensors, and transdermal alcohol sensors, enable continuous behavioral monitoring and timely feedback, thereby enhancing personalization and the potential effectiveness of just-in-time adaptive interventions. Ramos et al. (2021) analyzed log data from over 32,000 users of the Jellinek Digital Self-Help program to develop machine learning models predicting dropout and success in an online intervention for alcohol and substance use. The Jellinek Digital Self-Help is an unguided, evidence-based intervention grounded in cognitive-behavioral and motivational interviewing principles, comprising six modules that promote substance use reduction through educational content, self-reflection, and automated feedback. Key predictors of success included initial daily consumption, engagement metrics (e.g., logins and forum visits), and goal orientation (e.g., quitting vs. moderating use). The Random Forest model achieved an area under the ROC curve of 0.71 for alcohol users, demonstrating strong predictive validity and scalability for early intervention (Ramos et al., 2021).

In addition to predictive tools, behavioral interventions have been digitized. For instance, the Bhoos app provided motivational messages and real-time behavioral prompts tailored to user data, improving user engagement and promoting safer choices (Chow et al., 2025). The Bhoos app is a smartphone-based just-in-time intervention designed to promote safer drinking among college students. It provides on-demand educational content, real-time feedback, and personalized notifications based on users' logged drinks and estimated blood alcohol concentration (Chow et al., 2025). Another effective approach is Personalized Normative Feedback (PNF), which is often integrated into mobile-based interventions, such as the Pregaming Awareness in College Environments (PACE) program. PACE is a brief, evidence-based mobile intervention designed to reduce heavy pregaming among college students, a behavior associated with high blood alcohol levels and negative consequences (Pedersen et al., 2022). Adapting the Brief Alcohol Screening and Intervention for College Students (BASICS) model, the program integrates motivational interviewing, cognitive-behavioral skills training, and harm-reduction strategies into an accessible, student-centered format. Through Personalized Normative Feedback (PNF), participants receive individualized comparisons of their drinking patterns with campus norms, helping correct common misperceptions that reinforce risky behaviors and encouraging safer, more moderate alcohol use (Pedersen et al., 2022).

Research Gap

Rezapour et al. (2023) demonstrated that pandemic-related stressors such as disrupted work schedules, isolation, and emotional exhaustion significantly increased alcohol consumption among healthcare workers, underscoring how unaddressed psychosocial factors can intensify risky drinking behaviors. Their findings suggest that similar contextual stressors may influence college students' engagement with digital health tools, as behavioral interventions often fail when emotional and situational determinants are overlooked (Rezapour et al., 2023). This reinforces the need to design digital prevention programs that integrate stress and coping mechanisms into their frameworks.

Despite increasing recognition of the dangers of alcohol misuse among college students and the growing development of digital interventions, there remains a significant gap in understanding how effectively mobile

applications and electronic feedback tools reduce risky drinking behaviors in real-world college settings (Bertholet et al., 2023). While several studies have explored brief interventions, fewer have rigorously assessed long-term behavioral change, engagement, or adherence to mobile-based programs (Bae et al., 2023; Bertholet et al., 2023). Recent research using machine learning has shown promising accuracy, with models predicting more than 90% of high-risk drinking events from smartphone sensor data and about 76% of future drinking episodes using ecological momentary assessments (Schwebel et al., 2024).

Institutional and ethical barriers, technical limitations, and low student adoption continue to pose significant challenges to technology-driven alcohol prevention strategies in higher education (Fucito et al., 2025; Smith et al., 2022). A clearer understanding of how these technologies function in practice, along with evidence on their scalability and acceptability, is needed to address the current implementation gap and guide effective policy development in higher education (Fucito et al., 2025; Smith et al., 2022). In light of these considerations, the present paper aims to address existing gaps in the literature by focusing on the following research questions that seek to clarify the role, effectiveness, and implementation challenges of digital interventions for alcohol prevention in higher education settings.

Research Questions

How do mobile applications and electronic feedback interventions contribute to reducing risky drinking behaviors among college students?
What role does machine learning play in predicting and identifying patterns of alcohol misuse within university populations?
What are the challenges and opportunities in implementing technology-driven alcohol prevention strategies in higher education?

Method

We conducted a narrative review (Sukhera, 2022) to explore how technological approaches have been developed, integrated, and utilized to support the prevention and reduction of alcohol use among college students.

Database Search

An electronic search was conducted to identify peer-reviewed studies examining technology-based interventions targeting alcohol use among college students. The search strategy encompassed six major databases: EBSCOhost, ERIC (Education Resources Information Center), PubMed, PsycINFO, ScienceDirect, and Scopus, arranged in alphabetical order. To ensure comprehensive coverage, Google Scholar was also searched to include studies not indexed in the primary databases.

Table Error: Reference source not found outlines the key search terms and Boolean operators used to identify relevant peer-reviewed studies on technology-based interventions addressing alcohol misuse among college

students.

Table Error: Reference source not found. Search Strategy Using Boolean Operators

Keywords	Boolean Operators
College students and alcohol misuse	"College students" AND "alcohol misuse" OR "binge drinking"
Mobile health interventions	"Mobile health" AND "alcohol" AND "college students"
Personalized feedback apps	"Personalized feedback" AND "alcohol" AND "mobile apps"
Machine learning and prediction	"Machine learning" AND "alcohol misuse" AND "university students"
Digital behavior change tools	"Digital tools" AND "behavior change" AND "alcohol"
Alcohol prevention in universities	"Alcohol prevention" AND "college" OR "university"
Risky drinking behavior	"Risky drinking" AND "college students"
Campus health technologies	"Campus health services" AND "technology intervention"
Technology-based addiction treatment	"Technology-based" AND "addiction treatment" AND "students"
eHealth and college alcohol use	"eHealth" AND "alcohol use" AND "college students"

Study Selection

All retrieved records were independently reviewed by two authors (P.D.D. and N.G.) following the predetermined inclusion and exclusion criteria presented in Table Error: Reference source not found. The selection procedure was conducted in two systematic stages to ensure accuracy and interrater reliability. In the initial screening phase, both authors examined the titles and abstracts of all retrieved articles to determine their relevance to the research objective, specifically understanding how technology assists in addressing alcohol use among college students. Any disagreements regarding eligibility were resolved through discussion until full consensus was reached. During the full-text review phase, both authors conducted a detailed evaluation of all studies that passed the initial screening. When both a conference abstract and a peer-reviewed full article were available for the same study, only the full publication was retained to ensure completeness and methodological robustness.

Results of Study Selection

A total of 72 records were initially identified through the database search. After removing duplicates and screening for relevance, titles and abstracts were independently assessed by two reviewers (P.D.D. and N.G.) against the

eligibility criteria outlined in Table Error: Reference source not found. Following a comprehensive evaluation, seven studies satisfied all inclusion criteria and were retained for final analysis. Both reviewers carefully read the abstracts, methods, results, and conclusions of these seven papers to confirm their alignment with the research objectives and methodological standards. The included studies varied in scope, sample size, and technological focus, but all examined how digital or technology-based tools can be used to monitor, prevent, or reduce alcohol use among college students. The overall selection process is illustrated in Figure 1 (PRISMA flow diagram) (Tricco et al., 2018). Key details of the included studies are summarized in Table 3, while Table Error: Reference source not found provides an overview of their sample characteristics, research locations, and technologies used.

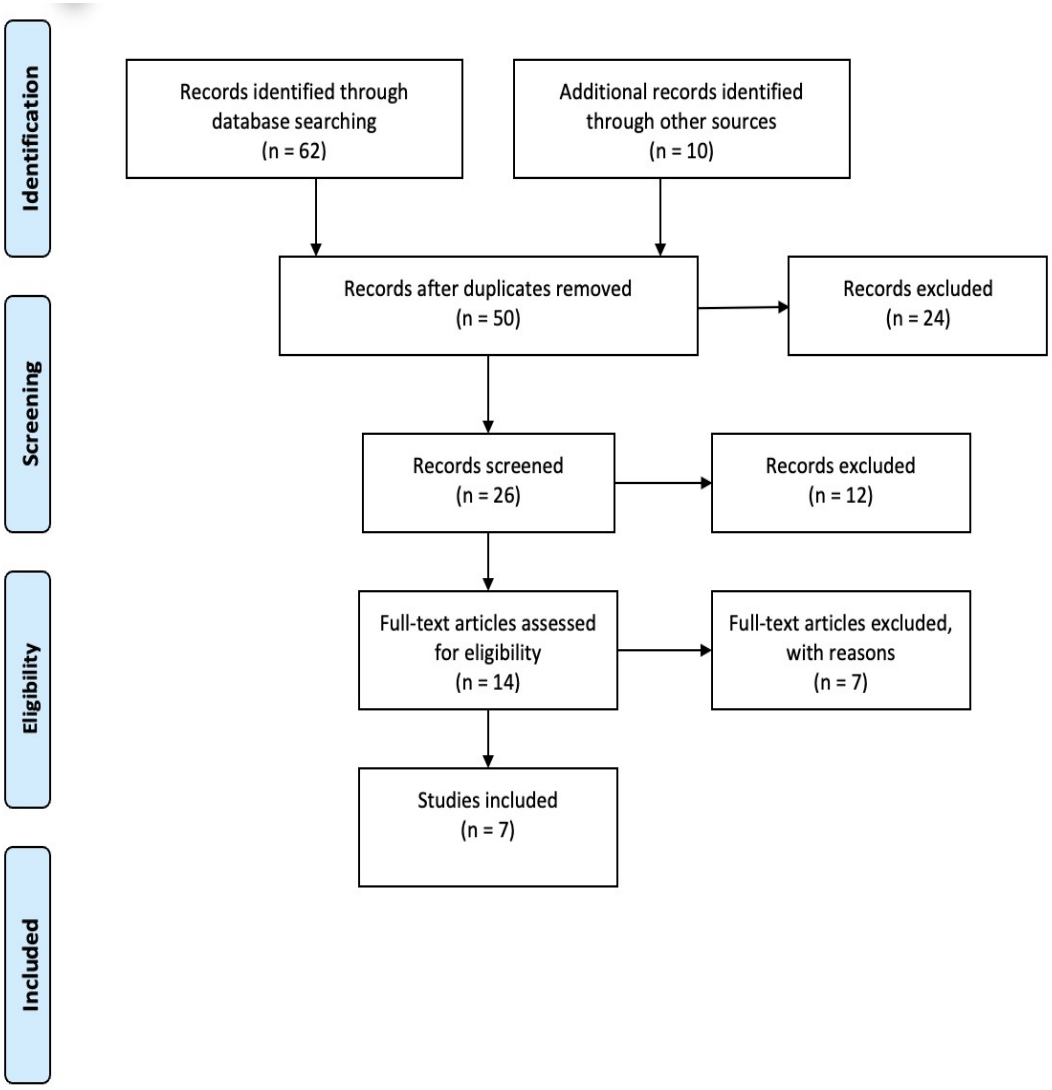


Figure 1. PRISMA Flow Diagram

The following figure illustrates the number of studies included in the review, categorized by their country of origin. The United States accounted for the majority of studies (n = 4), followed by Switzerland, Nigeria, New Zealand, and the United Kingdom (n = 1 each).

The content summarized as Distribution of Studies by Country is presented in Figure 2. Table 2 presents the inclusion and exclusion criteria applied during the study selection process, along with justifications to ensure transparency and consistency in identifying relevant research.



Figure 2. Distribution of Studies by Country

Table 2. Expanded Inclusion and Exclusion Criteria with Justification

Criteria	Inclusion	Exclusion	Justification
Population focus	Studies focusing on college or university students.	Studies on adolescents, high school students, or older adults.	College students face unique academic, social, and developmental pressures, making them a relevant group for alcohol intervention research.
Intervention type	Use of digital or tech-based tools (e.g., mobile apps, feedback systems, ML algorithms).	Interventions without any digital or tech-based elements (e.g., face-to-face only, paper-based programs).	This review specifically targets technology-driven strategies, aligning with the rise of digital health solutions.
Study design	Empirical research using quantitative, qualitative,	Theoretical papers, opinion pieces, or	Empirical evidence is essential for evaluating

Criteria	Inclusion	Exclusion	Justification
	or mixed methods that reports measurable outcomes.	protocol-only studies without reported outcomes.	the effectiveness and usability of interventions.
Publication type	Peer-reviewed journal articles with full-text access in English.	Grey literature, editorials, blog posts, non-peer-reviewed material, and non-English sources.	Ensures the academic quality, credibility, and accessibility of included studies.
Timeframe	Studies published between 2021 and 2025.	Studies published before 2025.	Captures literature aligned with modern tech adoption and relevant digital health trends.
Outcomes measured	Studies reporting on behavioral, psychological, or health outcomes (e.g., binge drinking frequency, risk awareness).	Studies that do not report any outcomes related to behavior or health (e.g., conceptual models without data).	Behavioral and health-related outcomes are crucial for assessing the effectiveness of the intervention.
Method of delivery	Interventions delivered via mobile devices, web platforms, wearables, or AI-enhanced systems.	Programs are delivered only in-person, via print, or without digital engagement.	Reflects the focus on scalable, tech-based solutions that can reach students easily and cost-effectively.
Data availability	Studies with clearly reported methods, outcomes, and limitations.	Studies with missing data sections, no transparency in methods, or unclear reporting.	Transparency in data is essential for reproducibility and critical appraisal.
Ethical considerations	Studies approved by ethical review boards or that report informed consent processes.	Studies lacking mention of ethical approval or with questionable consent practices.	Ethical rigor ensures participant safety, especially in sensitive topics like alcohol misuse.
Geographic scope	Studies conducted in higher education settings globally, provided participants are college students and interventions are tech-based.	Studies focused solely on community programs or secondary schools outside the context of higher education.	Ensures comparability and relevance of context within university environments.

Table 3 summarizes key studies examining technology-based interventions for alcohol use among college students, highlighting their research designs, main findings, strengths, and limitations.

Table 3. Studies of Interventions for Alcohol Use in College Students

No.	Authors (Year)	Research Design	Findings	Strengths	Limitations
1	(Bae et al., 2023)	Quantitative.	The model accurately predicted binge drinking a few hours before it occurred.	The model was highly accurate and effectively utilized real-time phone data.	The study had a small sample and relied on self-reported drinking data.
2	(Bertholet et al., 2023)	Quantitative	Students using the app drank less overall and had fewer heavy drinking days compared to the control group.	A large sample and high follow-up rate demonstrated the real-world effectiveness of a digital intervention.	Self-reported drinking data and limited impact on academic outcomes
3	(Eme et al., 2023)	Quantitative	Machine learning models (SVM and Random Forest) effectively predicted students at risk.	Use of real student data and comparison of multiple ML algorithms.	Limited to Nigerian institutions and based on self-reported survey data.
4	(Pedersen et al., 2023)	Quantitative	(Protocol study) Designed to assess whether the PACE app can lower drinking and related consequences during pregaming sessions.	Innovative, mobile-based, and context-specific intervention targeting a high-risk drinking behavior.	Results are not yet available, as this is a protocol paper.
5	(Riordan et al., 2022)	Quantitative	The combined WBI + EMI did not significantly	Large randomized design targeting	No significant intervention effects were

No.	Authors (Year)	Research Design	Findings	Strengths	Limitations
			reduce alcohol use or related harms compared to controls.	a critical transition period (start of university).	observed, with a limited impact on engagement.
6	(Smith et al., 2023)		Students found the app appealing and useful, but suggested minor design improvements and better tailoring to campus drinking culture.	Direct user feedback provided practical insights for refining the app before pilot testing.	Small sample and prototype testing limit generalizability and behavioral outcome data.
7	(Schwebel et al., 2023)	Qualitative.	Coping with depression, binge drinking frequency, and conformity motives were key predictors of alcohol-related problems.	Large multi-sample design with robust machine learning analysis identifying stable predictive patterns.	Exploratory design limits causal inference and relies on self-reported data.

Table 4 provides an overview of the included studies, summarizing the authors, sample characteristics, research locations, and types of technologies used to address alcohol use among college students.

Table 4. Summary of Studies, Author, Sample Size, Country, and Technology Mentioned

No.	Authors (Year)	Sample Size/Status	Country of Research	Technology Mentioned
1	(Bae et al., 2023)	45% of participants were currently enrolled in college	United States	Smartphone sensing
2	(Bertholet et al., 2023)	University students	Switzerland	Smartphone intervention
3	(Eme et al., 2023)	Colleges, polytechnics, and universities.	Nigeria	Support Vector Machine (SVM) and Random Forest (RF)

No.	Authors (Year)	Sample Size/Status	Country of Research	Technology Mentioned
4	(Pedersen et al., 2023)	College students	United States	Pregaming Awareness in College Environments (PACE)
5	(Riordan et al., 2022)	University students	New Zealand	Web-Based Intervention (WBI) and Ecological Momentary Intervention (EMI)
6	(Smith et al., 2023)	University students	United States	Mobile safer drinking app
7	(Schwebel et al., 2023)	College students	United States	Machine Learning

Rationale for Using a Narrative Review

A narrative review design was chosen for this study because it provides a rigorous yet flexible approach to synthesizing diverse research on how technology assists in addressing alcohol use among college students (Sukhera, 2022). Narrative reviews enable scholars to integrate theoretical, empirical, and contextual perspectives, producing a comprehensive understanding of complex behavioral and educational issues that cannot be captured by narrowly focused systematic reviews (Sukhera, 2022). This interpretive framework accommodates multiple worldviews, emphasizing reflection, coherence, and critical synthesis rather than exhaustive data aggregation. Methodological rigor was further ensured by following the recommendations of Green et al. (2006), who highlighted the importance of transparency, balance, and methodological discipline in constructing narrative overviews. Their guidance emphasizes that authors must clearly define the research scope, articulate inclusion decisions, and employ a structured process of evidence evaluation to minimize bias and enhance interpretive validity. These principles align with the concept of a “best-evidence synthesis,” which merges methodological consistency with narrative insight. To reinforce the reliability and clarity of the review, the Scale for the Assessment of Narrative Review Articles (SANRA) was applied. SANRA evaluates narrative reviews across six dimensions: significance, aims, literature search, referencing, presentation of evidence, and discussion of endpoints, demonstrating acceptable inter-rater reliability (ICC = 0.77) and internal consistency ($\alpha = .68$) (Baethge et al., 2019). These methodological frameworks ensured analytical depth, coherence, and credibility throughout the review.

This methodological approach aligns seamlessly with the objectives of the present study, which examines how digital- and AI-based interventions, such as mobile health applications, wearable sensors, and machine learning models, contribute to reducing alcohol misuse and promoting behavioral change among college students. The narrative review framework enables the integration of theoretical, behavioral, and technological perspectives,

connecting evidence from psychology, education, and digital health to build a coherent understanding of technology's role in prevention and intervention strategies. By adopting this flexible yet systematic approach, the study not only synthesizes emerging evidence but also identifies conceptual patterns, methodological gaps, and practical implications relevant to higher education and public health practice.

Discussion

In the following sections, we will discuss how technology-based tools, such as mobile apps, web applications, and machine learning, help reduce risky drinking, predict alcohol misuse, and address related challenges and opportunities in higher education.

How Do Mobile Applications and Electronic Feedback Interventions Contribute to Reducing Risky Drinking Behaviors among College Students?

Mobile applications and electronic feedback interventions have emerged as effective tools for reducing risky drinking behaviors among college students by promoting self-awareness, motivation, and timely behavioral support (Bertholet et al., 2023; Pedersen et al., 2022).

Bertholet et al. (2023) conducted one of the most comprehensive randomized controlled trials to date, involving 1,770 university students from four higher education institutions in Switzerland. The study demonstrated that participants who received a smartphone-based intervention integrating personalized normative feedback, goal setting, and self-monitoring tools significantly reduced their average number of drinks per week and the frequency of heavy-drinking days compared with control groups over a 12-month follow-up period (Bertholet et al., 2023). The intervention's design, featuring motivational and behavior-tracking modules, fostered self-awareness and accountability. Its focus on usability, persuasive design, and a non-judgmental interface enhanced engagement and adherence. These elements contributed to sustained reductions in alcohol use, highlighting the potential of smartphone interventions as scalable prevention strategies for university populations (Bertholet et al., 2023).

Bae et al. (2023) conducted their study at the Stevens Institute of Technology in collaboration with Stanford University, Rutgers University, and the University of Washington, involving 75 young adults aged 21 to 25 years ($M = 22.4$, $SD = 1.9$) who reported risky drinking behaviors. Using smartphone-based sensors, including GPS, accelerometers, and activity logs, the researchers developed a machine learning (ML) model capable of predicting same-day binge-drinking events (BDEs) one to six hours before onset. The XGBoost model achieved 95% accuracy on weekends and 94.3% accuracy on weekdays, demonstrating high precision in identifying imminent high-risk drinking episodes (Bae et al., 2023). The system enabled just-in-time adaptive interventions (JITAIs) that delivered personalized notifications before predicted drinking events, offering coping reminders or alternative actions. This predictive and preventive framework represented a shift from retrospective counseling to proactive behavioral modification. By incorporating explainable artificial intelligence (XAI) methods such as Shapley additive explanations, the model enhanced transparency, thereby improving user trust and engagement (Bae et al., 2023).

Pedersen et al. (2022) at the University of Southern California developed and evaluated the Pregaming Awareness in College Environments (PACE) program, a mobile-based intervention targeting the high-risk practice of "pregaming"—drinking before social events—a behavior strongly associated with alcohol-related harms such as blackouts, injuries, and impaired decision-making. The randomized controlled trial involved 500 undergraduate students aged 18–24 who reported pregaming at least once per week (Pedersen et al., 2022). The PACE intervention integrated cognitive-behavioral principles, motivational interviewing, and personalized normative feedback to correct students' misperceptions about peer drinking norms. Participants received visual and narrative feedback comparing their perceived norms with actual campus data, which effectively reduced overestimations and encouraged moderation of their behavior. The study underscored how technology-enabled, theoretically grounded interventions can extend the reach and impact of evidence-based behavioral models by delivering them through accessible and engaging mobile platforms (Pedersen et al., 2022).

Complementing these approaches, Riordan et al. (2022) conducted a large randomized controlled trial at the University of Otago, New Zealand, to evaluate a combined Web-Based Intervention (WBI) and Ecological Momentary Intervention (EMI) designed for incoming first-year students during the transition to university. A total of 783 participants were randomly assigned to one of three groups: WBI + EMI, WBI-only, or a control group (Riordan et al., 2023). The intervention integrated personalized web feedback with eight text messages during Orientation Week and six follow-up messages throughout the semester, timed to coincide with high-risk events, such as the university's "Toga Party." Although reductions in alcohol use across all groups were observed over time, there were no significant differences between conditions in Orientation Week or academic-year drinking or alcohol-related harms. Riordan and colleagues concluded that, while timely text-based interventions can raise awareness of risky drinking and align with students' social contexts, stronger effects may depend on tailoring messages to individual drinking patterns and embedding them within broader environmental policies (Riordan et al., 2023).

These studies show that personalized, theory-driven, and technology-enabled interventions can effectively support harm reduction and foster long-term responsible drinking habits among university students (Bae et al., 2023; Riordan et al., 2022).

What Role Does Machine Learning Play in Predicting and Identifying Patterns of Alcohol Misuse Within University Populations?

Machine learning (ML) enables proactive, personalized detection of alcohol misuse among university students by analyzing complex behavioral and contextual data, overcoming the limitations of self-reported surveys. Through large, multidimensional datasets, ML models can identify hidden patterns and predict high-risk drinking behaviors before they occur (Bae et al., 2023; Eme et al., 2024; Schwebel et al., 2024).

Eme et al. (2024) applied Support Vector Machine (SVM) and Random Forest (RF) algorithms to a dataset of 1,470 students from Nigerian tertiary institutions to predict the impact of alcoholism and drug abuse on academic performance. Their models utilized survey-based data on students' academic records, behavioral tendencies, and

substance use patterns. Results showed that both models effectively classified students' risk levels, with the SVM model achieving slightly higher accuracy (Precision = 0.97; Recall = 1.00; F1 = 0.99) than the RF model. These findings highlight the potential of machine learning tools to identify at-risk student populations and inform early, data-driven intervention strategies (Eme et al., 2024).

Bae et al. (2023) highlighted the critical behavioral and contextual features that contributed most to imminent binge-drinking events. Time of day, travel range (radius of gyration), and reduced phone interaction (e.g., fewer calls or messages) emerged as key predictors of risky drinking behavior, suggesting that decreased digital communication may signal social withdrawal preceding alcohol use. The study also revealed distinct weekday–weekend patterns: movement between multiple locations and extended travel distances were more predictive of binge drinking on weekends, whereas stationary behavior was more relevant during weekdays. Importantly, the explainable AI analysis demonstrated that higher acceleration activity (indicating physical or social engagement) was inversely associated with the probability of binge drinking, suggesting potential behavioral markers for early prevention. These insights underscore the value of integrating behavioral context and mobility data into digital health models to inform personalized, real-time alcohol prevention strategies (Bae et al., 2023).

Schwebel et al. (2024) conducted their study at the Center on Alcohol, Substance Use, and Addictions at the University of New Mexico, in collaboration with the University of Washington and multiple partner institutions across the United States. Using data from two large multisite samples of college student drinkers, 5,090 participants from 10 universities (Protective Strategies Study Team) and 2,808 participants from another 10 universities (Addictions Research Team), the researchers examined predictors of alcohol-related harm. Participants were typically around 20 years old (M = 20.59–20.89 years), with most identifying as female and non-Hispanic White (Schwebel et al., 2024). The study aimed to apply regression tree analysis, a machine learning technique, to identify key predictors and threshold values associated with negative alcohol-related consequences and to test their stability across independent samples. The findings revealed that coping with depression, conformity motives, and binge drinking frequency were the strongest and most consistent predictors of alcohol misuse severity. By identifying these variables and their cut points, the model offers a data-driven framework to help campus health programs detect at-risk subgroups and address the contextual factors contributing to hazardous drinking among college students (Schwebel et al., 2024).

These findings underscore the transformative role of machine learning in prevention science. By facilitating early identification of risk, continuous behavioral tracking, and customized interventions through digital platforms, ML shifts alcohol misuse prevention in higher education from traditional one-size-fits-all strategies to adaptive, data-driven systems that enhance student health and academic outcomes (Bae et al., 2023; Eme et al., 2024; Schwebel et al., 2024).

What Are the Challenges and Opportunities in Implementing Technology-Driven Alcohol Prevention Strategies in Higher Education?

Technology-driven alcohol prevention in higher education offers personalized, data-driven interventions through

mobile apps, web tools, and machine learning models (Bae et al., 2023). However, challenges such as data privacy, accessibility, and sustained student engagement limit effectiveness (Bertholet et al., 2023; Smith et al., 2022). Successful implementation also requires institutional support and integration within existing prevention programs (Pedersen et al., 2022).

One of the major challenges is user engagement and long-term adherence. Although digital interventions are appealing for their accessibility and interactivity, many students discontinue use after the initial phase, as sustained motivation to engage with app features often declines over time (Smith et al., 2022). Smith et al. (2022) reported that students valued the eBAC calculator and drink-tracking features but emphasized that sustained engagement depended on aesthetic appeal, personalization, and alignment with the local university's drinking culture. Bertholet et al. (2023) observed that although their smartphone-based program led to measurable short-term reductions in drinking, participation and responsiveness gradually decreased after several months, indicating that digital fatigue and low motivation can reduce long-term effectiveness.

Privacy and ethical issues also remain significant barriers. Many AI-supported and sensor-based interventions rely on collecting sensitive behavioral data, such as location, movement, and social interactions (Bae et al., 2023). Bae et al. (2023) reported that while their predictive algorithm achieved high accuracy in identifying imminent binge-drinking events, collecting sensitive behavioral data, such as GPS location and movement patterns, raises important privacy and ethical concerns. The authors emphasized that ensuring transparency, secure data handling, and informed consent is essential for maintaining participant trust. They also noted a trade-off between data granularity and prediction accuracy, underscoring the need to balance privacy protection with model performance.

Institutional integration poses another key challenge. While universities acknowledge the growing need for technology-driven health promotion, they often face structural and administrative constraints in embedding such tools within their existing systems (Pedersen et al., 2022). Although Pedersen et al. (2022) focused on developing and testing the PACE mobile intervention within a controlled research context, its broader adoption across university campuses would likely require coordination among student health services, counseling centers, and information technology departments to ensure sustainable implementation.

Despite these challenges, technology-driven prevention offers substantial opportunities for improvement. Digital interventions, such as mobile and web-based applications, can deliver personalized, scalable, and cost-effective strategies that simultaneously reach large student populations, enabling real-time feedback and engagement during high-risk drinking periods (Riordan et al., 2023; Smith et al., 2022). Web-based and mobile programs can deliver tailored feedback based on individual drinking patterns and risk factors, making them more adaptive than traditional group-based workshops (Smith et al., 2022). Machine learning further enhances these interventions by allowing real-time monitoring and prediction of risky behaviors (Schwebel et al., 2024).

Technology also fosters student autonomy and self-awareness. Interventions such as PACE and web-based ecological momentary feedback programs (Riordan et al., 2022) encourage students to self-monitor their alcohol use, compare it with peer norms, and reflect on their behavior. This self-directed approach resonates with the autonomy-oriented developmental stage of young adults and enhances intrinsic motivation to change (Riordan et

al., 2022). Technology-driven alcohol prevention strategies in higher education face challenges related to student engagement, adherence, and institutional support. Riordan et al. (2022)found that, despite receiving timely and personalized messages during high-risk events, many students did not actively engage with the web-based and mobile interventions, partly due to competing academic and social demands. Limited integration with campus policies and the lack of adherence-tracking also reduced effectiveness. However, these technologies offer key opportunities: they enable scalable, real-time feedback, promote self-regulation through personalized messaging, and align with students' digital lifestyles, making them promising tools for adaptive and student-centered alcohol prevention (Riordan et al., 2022). Despite challenges in engagement, ethics, and implementation (Bae et al., 2023; Pedersen et al., 2022; Smith et al., 2022), technology-driven prevention offers scalable, personalized solutions that promote healthier behaviors among university students (Riordan et al., 2022; Schwebel et al., 2024).

Limitations

This review has several noteworthy limitations. The analysis was restricted to English-language publications, potentially excluding significant contributions from studies published in other languages. This limitation reduces the cultural and geographical diversity of the evidence base, potentially overlooking findings from regions where alcohol prevention technologies are emerging but underrepresented in English databases. The review employed a narrative synthesis approach to examine diverse technological strategies addressing alcohol misuse among university students. Although this method allows for a broad and interpretive understanding of the topic, it does not provide the empirical precision or replicability found in systematic reviews or quantitative meta-analyses. As such, the insights presented here should be considered exploratory and conceptual rather than conclusive. The reviewed studies varied considerably in their designs, participant characteristics, and intervention types. Many studies relied on self-reported data, which can be influenced by recall bias and social desirability, thereby limiting the reliability of the measured outcomes. Finally, the review did not incorporate original empirical testing or cross-validation of digital interventions, resulting in synthesized evidence that primarily reflects observed trends rather than verified causal relationships.

Suggestions for Future Research

Since several studies in this review have successfully incorporated objective data sources, such as smartphone sensing, wearable tracking, and automated behavioral monitoring, future research should continue to expand these approaches to achieve more accurate and scalable assessments of alcohol consumption. Broader integration of sensor-based, biometric, and real-time behavioral data across multiple university settings would reduce the limitations associated with self-reporting and enhance the reliability of outcomes. Additionally, using larger, more diverse samples across institutions and cultural contexts would strengthen the generalizability and external validity of the findings.

Conclusion

The increasing integration of digital technologies into higher education presents new opportunities to address

alcohol misuse among college students through innovative, evidence-informed approaches. The findings of this review indicate that mobile applications and electronic feedback interventions effectively reduce risky drinking behaviors by offering personalized feedback, behavioral monitoring, and real-time support that encourage self-regulation and responsible decision-making. Machine learning contributes significantly by identifying behavioral patterns and predicting potential alcohol misuse, allowing for timely and adaptive interventions. The successful implementation of these technology-based strategies remains constrained by challenges such as ethical concerns, limited institutional infrastructure, low long-term engagement, and variable student accessibility. Continued research focusing on broader, longitudinal, and ethically grounded applications will be essential to strengthen the evidence base and enhance the impact of digital prevention initiatives in higher education contexts.

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